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Agriculture.

REPORT ON WORK, AGRICULTURAL COLLEGE.—APRIL, 1903.

Farm.—During the month a great deal of work has been done on the farm and garden, 26 horses and 2 mules being kept constantly at work. The following is a digest of the work performed:—Mowed, raked, and hauled lucerne from 6 acres of plot 13, the yield being 4 tons 10 cwt., and the cost £1 8s. 8d.; also from garden plot 2, 18 acres, yield 5 tons 16 cwt., cost of harvesting £3 17s. 8d.; and from Creek paddock, No. 2, plot 1, 12 acres, yield 7 tons 7 cwt., at a cost of £1 17s. Panicum:—Creek paddock, No. 2, plot 2, 18 acres (second cutting), yield 16 tons 10 cwt., total cost of harvesting £3 10s. 10d.; garden paddock, No. 7, 1 acre, cost of mowing 3s. 8d., crop destroyed by weather; calf paddock, No. 2, 5 acres, cost of cutting 5s. 4d., crop destroyed by rain; sheep paddock, plot No. 1, 10 acres, cost of cutting 16s., crop destroyed by weather. All the panicum crops described as having been destroyed by the weather have been stacked, and will be used up for litter. The grass was cut in the bull paddock, plot No. 3, 18½ acres, where the mowing, raking, and hauling were done for a total cost of £3 19s. 8d., the yield being 11 tons. This plot was afterwards raked and ploughed, at a total cost of £10 3s.; owing to the dry nature of the subsoil, extra horses were required for ploughing to the depth necessary—9 inches; this, of course, added to the expense of cultivation. In the farm paddock, in section 9, 2¼ acres were sown with mangolds, the cost of labour being 11s. 9d.; 2¼ acres of swede turnips were planted in the same plot, cost 11s. 9d.; also, ½-acre of carrots, cost 3s. 10d. This section had been ploughed twice and subsoiled to a depth of 15 inches at a cost of £5 15s. 10d., not included in cost of planting given above. School paddock, plot No. 2: 14 acres were planted with wheat (Allora Spring), cost 13s. 6d. In the farm paddock, section 14, experimental plot (1½ acres), mowing and clearing the grass and ploughing cost £1 14s.; second ploughing and subsoiling, 33s. Garden plot No. 1 (1½ acres), first ploughing and harrowing, cost 20s. 8d.; second ploughing and harrowing, 18s. 4d. Owing to the shortness of the land, entailing loss of time in turning the horses at the headlands, the cost of cultivation was greater than it would otherwise have been. The cost of cultivating and planting the various crops is arrived at in the following way:—Each horse is valued at 2s. per day, farm labourer at 5s. per day, and student labour at 2d. per hour; the labour employed on all work is correctly recorded for future information. The weather during the month under review was favourable to cultivation, although in many places the late rains have not reached the subsoil. The rainfall was 0.79 inch for five days, the heaviest being on 2nd April (0.30) and 11th (0.21).

Garden.—A great deal of cultivation and planting has been done in this department. The eradication of couch grass involved a large amount of labour; this can be effected only by means of ploughing the land and bringing the grass to the surface, where it may be allowed to decay, or removing it to some convenient place and allowing it to form a compost. Large numbers of vegetable seeds were planted. Cabbages, cauliflowers, &c., were transplanted, and are making rapid growth. Root and other crops planted some time ago are now making good growth. During the month it was necessary to again resort to irrigation. The orchards and vineyards have been kept in good tilth and free from weeds, and all suckers have been destroyed by removal.

Dairy and Piggery.—The average number of cows milked was 54 head. 1,022 gallons of milk were converted into butter for a yield of 445 lb., and 665 gallons gave a return of 710 lb. of cheese; 360 gallons were supplied to the dining hall, 102 gallons to private houses, and 255 gallons fed to calves. The increase for the month was—1 Shorthorn bull, 1 Ayrshire heifer, 1 Shorthorn heifer, 4 Ayrshire-Shorthorn crossbreds, and 1 Holstein-Devon. We disposed of 1 Shorthorn bull, also 1 grade Guernsey bull. The cattle are all in nice condition, and milking well. Some of the crossbreds are now in milk, the results from which will be made known later on.

In the piggery, the increase for the month was as follows:—Large Yorkshires, 7 boars, 2 gilts; Berkshires, 7 boars, 5 gilts. We disposed of 11 Berkshire boars, 4 sows; 1 Middle Yorkshire boar; 2 Tamworth boars, 2 sows, 5 weaners. There is at present a great demand for the Middle Yorkshires, a breed which is fast coming into favour.

MECHANICAL DEPARTMENT.—The principal operations in this department were the laying water-pipes to experimental plots; making bridges over drains near dairy; erecting new calf-pens; making large box-drain through implement shed; general repairs. Blacksmithing:—Making swingle-trees, shoeing horses, and repairing implements. In addition to the above, the accommodation for poultry has been extended by the erection of a yard and two sheds.

POTATO-DIGGING MACHINE.

These machines are steadily being put before the agricultural public by their various makers. Most of them have been stated to have faults which must be remedied before they could be adopted. At last, however, a Ransome machine has appeared which is said to be a perfect invention. It was tried a couple of months ago in New Zealand on a crop of Puritans, estimated to average 8 tons per acre. The result is said to have exceeded all expectations. The potatoes were disinterred without any being damaged. None, or only very small ones, were left in the ground, which was reduced to a fine tilth and left perfectly level.

THE AUTO-MOBILE ON THE FARM.

At a conference of the Northern Branches of the Agricultural Bureau of South Australia, Mr. A. Miell, of Crystal Brook, read a paper on this subject. Throughout the drier portions of Australia farmers frequently experienced great difficulties in providing fodder for their working stock, and this leads one to consider whether it is not possible to largely supersede horses with traction power. The various magazines had been telling of the work done in this direction in America, where steam traction has, on the larger farms, taken the place of horse-power for tilling and harvesting operations. Vast strides in this class of machinery had been made of late years, and some of the engines draw ploughs breaking up the soil to a width of 30 feet at one operation. One great advantage of these engines was that a large area can be turned over in a short time. To the Australian farmer, whose ground rapidly becomes too dry and hard to plough properly, this was a very important item. The large harvesting machines drawn by the traction engines have reaped and bagged the crop on 150 acres in one day, eight men being required to work them. While such large machines would not be suitable to Australian conditions, there were smaller ones equally useful. The *Field* of 23rd November, 1902, speaks very highly of the work done by the Ivel agricultural motor, a British machine of 8-horse power. When at work the motor was drawing a plough at the rate of four miles an hour; it was very simple in construction, and can be worked by any intelligent man with a little instruction. In ploughing it is claimed to do as much work in a day as two similar ploughs drawn by horses. The rate and regularity of speed, and the longer hours that it can be worked, are great factors in its favour. The motor had been previously used to draw reaping machines, binders, mowers, and also drawing wagons on the road. The cost of petrol was 8d. per hour for reaping, and slightly more for ploughing. The motor weighs under 17½ cwt., and the weight is distributed over three wide wheels, consequently it makes but little impression on the soil. The wide wheels give a splendid grip, no matter how soft or sandy the land may be. The cost of maintaining such motor—of which quite a number are now in use in Great Britain—would certainly not be more than the keep of horses required to do the same work, and when not in use it can be housed, and costs nothing to maintain. On the larger holdings of South Australia, the horse feed bill was a very serious item. Last year on his own farm the market value of the feed consumed was nearly £500, and his experience was by no means singular. Besides the actual cost, they were often reduced to desperate straits to keep their horses alive during periods of drought, and while he did not expect horses to be altogether dispensed with on farms he was convinced that during the next decade the progressive farmer of Australia will advance with the times, and as horsepower for chaffcutting has been displaced by oil engines so auto-mobile machinery will displace horses for traction work on the farm.

Members were generally rather sceptical of the possibility of Mr. Miell's forecast coming true. The risks of fire were considered too great in such a dry climate, and the sandy nature of so much of our land was thought to be a serious obstacle in the way. Mr. Miell intimated that if the cost of the Ivel motors was reasonable it was not improbable that the members might be afforded an opportunity of seeing what they could do in Crystal Brook district.

PUMPKINS UNDER IRRIGATION.

Another proof (says the *Brisbane Courier*) of the marvels worked by water applied to good soil is supplied by Mr. R. T. Keys, Bengalla, whose irrigation farm on the Hunter has produced some remarkable crops this season (says the *S. M. Herald*). Mr. Keys planted 2 acres of pumpkins, and from this area he has gathered 7,500 table pumpkins, the vegetables being counted to demonstrate the immense yield from the land. The crop was grown in the drought, when all the other pumpkin crops in the district were almost a total failure. The pumpkins were planted in November, and the land was irrigated immediately after planting, and every third week during the growth of the crop. The whole of the moisture was therefore supplied by irrigation, the trifling rainfall being of no material benefit to the pumpkins. The local market value of the crop was £93 15s., 625 dozen pumpkins at 3s. per dozen giving a return of £46 17s. 6d. per acre from an irrigated product which was raised in six months. The present value of the river flats in the vicinity of the Bengalla irrigation farm is £6 per acre, and agriculturists who have had practical experience of the land under the usual system of farming hold that while the crops depend on the natural rainfall £6 per acre is full value. Private enterprise in irrigation has therefore in this instance added enormously to the producing value of the soil to which the water is applied. What would be the increase in land values were the water rendered available for a large area of these river flats? According to Mr. Keys's returns from lucerne and other crops it should jump to at least £40 per acre.

SPROUTING POTATOES BEFORE PLANTING.

PREPARING THE SEED.

This is more often practised with cultivators of the garden than on the farm, but it has some decided advantages which all potato-growers may benefit by. Seed potatoes are often badly prepared for planting. As a rule, they are kept in heaps until a little while before they are wanted in spring. This is usually in a close, dark shed or clamp, and when they are looked to it is generally found that the growths have made considerable progress. They may be 2 inches, 3 inches, or 4 inches in length. They grow through amongst the tubers like a network, and the greater part of them are broken off in moving the tubers or before they can be separated. Many have little regret in doing this. They think it is necessary, and it is; but it is also exceedingly harmful, and this ought to be remembered, as deteriorated seed is always more or less unproductive. Fancy what the result would be were we to allow our corn to sprout unduly before sowing! The excuse is that potatoes will resprout, and they will; but never so robustly as in the first instance. These long growths take a great deal out of the tuber which ought to be kept in reserve to facilitate the ordinary growth in the soil, and superfluous growth should be wholly prevented. This is easily accomplished if given timely attention, and I would urge growers that they look to their seed tubers at once.

The first treatment should consist of preventing the growths from becoming long or of a pale colour, which occurs when they are kept in the dark. Begin keeping them in the right way by turning the tubers over and removing any diseased one meets with. Do not put them in a heap again, but lay them out in a single layer on the granary floor or some other building where they will be fully exposed to the light and receive a good deal of air. This will not only check the production of long, weakly shoots, but it will green and harden the tubers, and this is a great benefit to them, as a greened tuber is much more hardy to come in contact with the soil than one that has been kept from light and air for six months or more. The growths, which will be slowly produced when laid out in a single layer and in light and air, will be short and robust and altogether different and superior to the shoots drawn up in the heap.

THE LEAST EXPENSIVE WAY.

This laying out is one way of sprouting potatoes which should be followed by every farmer who attempts potato culture. It is the least expensive way of treating them, and will always pay handsomely, as the first growth and subsequent results from prepared tubers are infinitely better than when they are taken straight from the heap and planted, which very many are, unfortunately. But there is another way of sprouting which is still better. This is to get a number of wood trays from 2 inches to 3 inches deep and of any width and length; from 3 feet to 4 feet long and 2 feet to 3 feet wide are handy sizes. A litle fine soil is put in the bottom, and the tubers are stood up on end as close as they can be packed in the trays. The ends with the eyes or buds on them are kept up, and the trays are placed in light, airy sheds or suchlike places. Forcing them into growth is not advisable, the object being to get hardy little shoots on the tubers, which will not be checked when they come in contact with the soil in planting. The growths should not be more than 1 inch long when planted, and ½-inch is quite as useful a length. If trays cannot be provided for all of them there is no reason why the whole should not be laid out in sheds, or the early sorts may be sprouted in trays first, planted, and the trays again filled with late kinds. The right time to put them in trays is before growth begins, and many of the early ones will require attention at once. Sometimes there are blind tubers. When these are planted there is a blank, but in sprouting none but growing tubers should be planted. If it is seen that the growths are likely to exceed 1 inch in length before they can be planted, check them by admitting more air, but in doing this take care that a cold cutting wind does not reach them, and always be sure that they are protected from frost if that is occurring, as it still may. When the tubers are planted quite dormant it is often a long time before growth shows above ground. It might often be earlier without much chance of being injured by frost. All, too, desire their crops as early as possible if grown to meet early markets, and there is no better way of helping them on than the process of sprouting before planting, and having both tuber and growths in a sturdy, hardy condition when put in the soil. I have found this bring the crops in a fortnight or three weeks sooner at digging time than dealing with unsprouted tubers or those sprouted in the heaps, and the yield is also better from sprouted than unsprouted sets. Do not run away with the idea that there is a good deal of fiddling labour about it, and is not worth the bother, but look on it as a very important aid to successful culture and extra remunerative returns, and you will not be disappointed.—"Practitioner," in the *Farmer and Stockbreeder*.

JOHNSON GRASS.

The *Revue des Cultures Coloniales*, Paris, writing on various colonial products, cites Johnson grass as a plant introduced into the colonies, and denounces it as a dangerous, noxious weed. The journal mentioned says, *inter alia*, that the case of Johnson grass (rendered as Johnson Gros), a grass spread largely over tropical Africa and in the tropical regions of the Old World, proves how much discretion should be exercised in the introduction of seeds and foreign plants. This grass was introduced into South Carolina by an American who had been engaged by the Sultan of Turkey to teach the cultivation of cotton in that country. A certain Colonel Johnson, visiting South Carolina, took some seeds of the grass to Alabama, where he sowed them. Sixty years after his having introduced them, the *Andropogon halepensis* (the botanical name for the grass), spread as far as the 42nd degree N. lat., and is now one of the greatest sources of loss to cotton-growers. To eradicate it, the land must be deeply ploughed, and no matter how well the work is done, the entire plant cannot be got rid of. An industrial society is said to have taken out a patent for the destruction by a certain process of the "Johnson grass which obstructs cultivation."

This Johnson grass will yet be the ruin of those who encourage or neglect its spread in this State. We cited a case in point in last month's *Journal*, in our notice of Mr. Redmond's farm. The trouble will arise from the seeds being carried by the wind, by birds, by the hoofs of cattle, horses, and sheep to farms far and wide where the grass is now looked upon with disfavour.

SPANISH PEANUTS.

A correspondent of an American journal writes concerning the pea or earth nut:—After experimenting seven years with the different crops in the South, I have fully decided there is no crop made in the poorer farming districts that can be made with the ease, and is as valuable, as the early Spanish peanut.

Following are some of my reasons:—

First. Any kind of land will grow them. Of course, the better the land, the greater will be the yield, both in hay and nuts. I find, though, that sandy loam is the best, as the nuts are whiter, and are easier cleaned of sand, dirt, &c.

Second. As yet there has developed no worms or insects that destroy them during growth; this one point gives them the advantage over nearly every known crop. I find, too, that they will stand more dry weather than most crops.

Last year, after we had suffered from nearly three months' incessant drought, and during the growing season, I pulled up several hills of my Spanish variety and found they contained from 100 to 150 fully matured nuts. The average yield per acre was about 30 bushels.

Third. This is a very early variety—matures in this part of the South in about ninety days, and has been grown with good results as far North as Central Michigan. This is a bunch variety; the nuts are somewhat smaller than any other kind, but their nature in maturing evenly and adhering to the vines when pulled up gives to them another good point, which is found in only one other variety of the peanut family.

Fourth. And the uses that the nuts can be put to are many, indeed. I find, by feeding them to stock, that I have no trouble in having fat hogs, healthy horses, and hens that will lay the year round. One acre will fatten 8 or 10 head of hogs ready for market, and what other crop can do this on poor land without fertiliser? We never think of fertilising them with any kind of commercial fertilisers, yet we make from 20 to 40 bushels per acre on land that would not produce over 300 lb. of seed cottom or more than 15 bushels of corn.

Fifth. The hay from one acre is well worth the trouble of making the crop. I find that horses relish it as well as the best pea vine or clover hay, and as a milk producer for cows I find it second to none I ever fed.

The effect of peanuts on land is very much similar to cowpeas, as they leave the land in a more productive state than when they were planted.

In conclusion, will say that I find them to be "an all-right crop," and one that can be depended on, in wet or dry weather.

SELECTION OF SEED.

Mr. H. L. J. Vilmorin, a scientific experimenter on plant life, writing on the subject of "Selection and its Effects on Cultivated Plants," in the journal of the Royal Agricultural Society of England, takes a diametrically opposite view to that generally accepted by wheat and other cereal growers, and endorsed by Dr. Cobb, of the Department of Agriculture of New South Wales. He says:—

"In concluding these notes on selection, it appears advisable to touch upon a point to which certain people attach great importance, but on which my opinion does not agree with that usually held. I refer to the custom of collecting seeds from some certain part of a plant in preference to another. There is no idea more prevalent in gardening than that of the superiority of seeds collected from the base of the central stem over those of the top of the same stem, and especially over those of the lateral branches. I have made, and had made, experiments on this subject, and I have invariably found no difference among the seeds collected from various parts of the same plant with respect to the proportion of single and double plants obtained. I have repeated these experiments many times on ornamental plants with respect to the doubling of flowers, on vegetables with respect to the size and quality of the roots, *and on cereals with respect to the yield in weight and appearance* of the seed, and I have always found that, while individual plants may differ from each other in respect to the transmission of character, yet from the same plant there was great uniformity of results obtained. The larger seeds produce slightly more vigorous plants in the earlier periods of growth, but do not give any guarantee of ability to transmit superior qualities. When a plant is known to be thoroughbred, and its ability to transmit its own characters has been established, I should always prefer the smallest seed that came from it, although collected from the part of the plant which is considered the least favourable in the common opinion, to the largest seed taken from the part believed to be the most favourable of a plant whose pedigree is less certain."

QUEENSLAND CHAMBER OF AGRICULTURE.

We are informed by the secretary of the Chamber of Agriculture, Mr. F. W. Peek, that at a meeting of the chamber, held on 4th June, the matter of "clashing of shows" received consideration, and it was resolved to make an effort to prevent as far as possible the inconveniences caused thereby. It was decided to ask the various societies and associations to assist in this laudable object through the medium of the *Agricultural Journal*, and it was pointed out that a list of societies, with the dates of some shows, is published in it every month, and it would be asking only a very small favour of the respective secretaries if they would kindly furnish the fixed date or month (approximately) for holding their shows, with the object of preventing future clashing of dates.

[We willingly give publicity to this resolution of the Chamber of Agriculture. A glance at the list of societies in the *Journal* will show that out of 157 societies only thirty-four had up to June notified us of the dates of their intended shows during 1903. Another matter to which we wish to draw the attention of gentlemen acting as secretaries to the various societies and associations is, that it occasionally happens that a show date is altered, and notice of such alteration does not reach us in time for publication before the month in which the show is to be held, in which case shows are liable to clash, and sufficient publicity is not given to the events. If a show is to be held, say on the 22nd July, the notice should, if possible, reach us at least in time for publication on the 1st June—that is, the secretary should communicate the date to us by the 20th May. If only sent in June, it may happen that the issue of the *Journal* of the 1st July may not reach our subscribers who live at a distance until the middle of the month, and consequently the notice is of little value to them. We should be greatly obliged to the secretaries if they would assist us to give full publicity to their show dates by advising us thereof a month or two in advance.—Ed. *Q.A.J.*]

LUCERNE HAY-MAKING.

It may seem superfluous to write on this subject, seeing that for years farmers all over the coastal and Downs districts have been growing lucerne, and thoroughly understand the art of saving the crop. There are, however, many new beginners who have never had anything to do with hay-making, and a few words to put them on the right track may be of service to them. Every farmer knows that the whole success in hay-making lies in properly saving it. The first thing is to know when it is most advantageous to cut the crop for hay. The proper time is when the plants are just coming into bloom. Lucerne is one of those crops which suffer considerably by age, and if allowed to grow a couple of weeks after the plants are one-third in blossom, there will be a marked diminution in the total weight of crop as well as in the digestible food. Care should be taken, as far as possible, to mow when the weather bids fair to keep fine. After mowing it should lie in the field for a day or longer if the weather is cool. Lucerne must be very gently handled in order to prevent the loss of leaves, as it is on its leafiness that its market value depends. If rain should come on just after mowing, it is well to make small cocks, and spread the hay out again as soon as the rain has ceased. A better way, if the rain continues, is to put the lucerne at once into the silo. This will save the whole cut crop, whereas it would be rendered valueless if exposed to continuous heavy rain in the field. In our hot summer climate, a day is sufficient for the cut lucerne to lie on the ground. It should then be raked together, and cocked for another day or two, when it may be carted to the stack. Lucerne hay should be made quickly to avoid loss of leaves and colour. When stacked, do not be in too great a hurry to market it in bale form. Let it remain until it has finished sweating. If pressed too soon, it becomes musty or mouldy, and as a consequence the market price is depreciated. There is no difficulty in making lucerne hay, provided that the proper moment for cutting is chosen, that the weather be reasonably fine, and that care is taken in handling the hay.

HARROWING AND ROLLING GRAIN CROPS.

Mr. V. C. Redwood, in a paper on growing malting barley, read at the Agricultural Conference at Toowoomba in June, 1902, laid stress upon the necessity for rolling the ground when the barley is about 3 inches over the ground. No farmer should neglect to do this, as it acts as a soiling, strengthens the straw, makes the growth more regular, and gives a more even surface for the machines to work on. Grain crops of all kinds are benefited by both harrowing and rolling. All wheat sown from May to June will be the better for harrowing, as the surface becomes very hard and set, especially if rains occur in July, and the plants make slow progress in consequence, but if well broken by the harrows air and sunshine come in and mellow the surface, when the plants spread and thrive. It is advisable to harrow heavy land when it has had time to dry after rain, but light soil may be harrowed at any time. Some people are afraid to run the harrow over the wheat when it is already perhaps 6 inches high. They fear to tear it out, as they do not like the tattered appearance of the plants. Rolling again squashes the young plants flat on the ground, and they look to be ruined. But a genial shower and a few fine days soon make them look up and regain a healthy appearance. Meanwhile, the harrowing has made the surface friable, and the rolling has settled the soil about the necks of the plants, and it is now sweet and firm. This firmness of the soil is what wheat likes, as it roots more perfectly into a friable but firm soil than into a loose one. Again, grubs cannot work so easily in the firm soil; the rolling levels the ground, and thus enables the reaper to cut more closely. A furrowed roller is the best to use, as it makes the surface firm without giving it a smooth face.

UTILISING SAND DUNES.

An exchange says that the farmers at Wycheproof are coming to the opinion that the accumulations of sand heaped up along the fences and the top-dressing distributed more or less thickly over the paddocks by duststorms are not an altogether unmixed evil. It is found that in many places the coating of no more than a quarter of an inch thick has been remarkably effective in retaining the moisture derived from the rainfall of March. Shrewd cultivators intend to cart and distribute over their wheat lands the sand accumulated about the fences and other obstructions, while some propose to use the same material with the drill as a fertiliser.

This is carrying out the principle on which good crops are raised in the semi-arid regions of the United States of America. An account is given in one of the American rural journals of the marvellous success achieved in 1902, a year of widespread drought, by a South Dakota farmer, a Mr. Campbell. This farmer, who had been experimenting in tilling his claim, surprised his neighbours by harvesting a crop of potatoes that averaged 142 bushels an acre on 32 acres, while those on adjoining farms were nearly a failure. He gave as his guide in conquering the semi-arid conditions a variation from the usual method of tillage. Ordinarily, the farmer turns the furrow with the plough, and cultivates the top only sufficiently to ensure the destruction of the weeds. Mr. Campbell's plan was to plough very deep, and by means of specially constructed implements pack the bottom of the furrow. The top he kept well cultivated, approaching as closely as possible to making fine dust over the entire field. Even when there were no weeds showing, the cultivation was continued, the object being to form a blanket of fine soil over the seed-bed, and so retain to the end of the season a greater portion than usual of the rainfall, somewhat limited in that longitude. The theory was simple and the practice easy. It has gained a wide following, and is becoming one of the accepted principles of the farming of the new West. It means, when carried to perfection, that the natural rain waters will be absorbed readily into the ground, that they will be held there by the packing of the bottom of the furrow slice, and that undue evaporation will be prevented by the stratum of dust above.

Over the semi-arid region, where the rainfall is only about 12 inches a year, little or no moisture falls after the middle of June until autumn. Then it is that the corn withers, the wheat shrivels, and the fruit trees lose their strength. But it is noticed that if a quantity of coarse sand be scattered over a bit of soil, no matter how dry the summer, there will always be beneath it moist earth. So it was argued that if the bottom of the ploughed surface could be packed to retain the spring rains, and the top of the field could by frequent harrowing be kept in a sandlike state of fineness, the full value of the rainfall might be utilised. The flood of muddy waters that formerly rushed away towards the sea after every rain ceases, for the rains have gone into the ground where they fell. It is a new condition, and one that appeals to the farmer with great force.

STACK ENSILAGE.

BY A. CONLON, Government Dairy Instructor, in the *Agricultural Gazette of Tasmania.*

The Tasmanian dairy farmer is certainly slow to recognise the merits of ensilage, in spite of the fact that this system of conserving fodder is now far beyond the experimental stage. From my intercourse with farmers, I have concluded that the principal reasons for their reluctance to move in the matter are that the methods as generally given in the various agricultural journals are too elaborate and costly; and that farmers, speaking generally, prefer to watch the results of experiments made by others; in fact, they prefer a practical lead to a theoretical lesson.

I felt the need of formulating some simple and inexpensive system of ensilage, and of illustrating the same by means of lantern-slides when lecturing; and I was fortunate in securing the collaboration of Mr. Chas. Grueber, of Moonah, near Hobart. With his assistance, I have been enabled to secure slides illustrating the very simple operations necessary to ensure success in the making of stack ensilage. Mr. Grueber ensiles a crop every year on this system, and with invariable success.

ADVANTAGES OF THE STACK SYSTEM.

The stack system was chosen for illustration purposes, as being by far the cheapest method to follow, notwithstanding the slight loss which must invariably occur at the outer edges; and it will be understood that I do not advocate the stack system as being superior to built silos or pits, but only from an economical standpoint, as (under this system) no expenditure is incurred in the erection of silos, which are all more or less costly. Again, a stack may be erected in the paddock where the crop is grown. By this a great saving in cartage can be secured, whereas with the built silo or pit all fodder intended for silage must be carried thereto, no matter how distant the crop. It is also easier to make sweet silage in stack form than by the use of rigid silos; and a stack has an unlimited capacity: that is, it can be made of any size suitable to the quantity of fodder grown. There is also less waste in the larger stacks, owing to the fact that the larger the stack the less exposed surface in proportion to the mass.

THE INFLUENCE OF TEMPERATURE.

There are two kinds of silage—sweet and sour. It is with the former that we are concerned in the present article, as being the most suitable to make under the stack system. It is in controlling the result, or, in other words, in the production of sweet or sour at will, that the whole art of ensilage exists. This result depends chiefly upon the temperature which the mass has been allowed to reach, and the amount of pressure applied.

If, after carting the green material, heavy pressure is at once applied, the air is excluded, and the temperature of the mass is consquently kept at a low level. When by this means the temperature is prevented from rising above 120 degrees Fahr., sour silage results. On the other hand, for the production of sweet silage, the mass must not be weighted to any great extent before the temperature has reached from 130 degrees Fahr. to 150 degrees Fahr. Care must be taken not to allow the temperature to rise above 160 degrees Fahr., or the stack will become overheated and burnt. The intelligent use of the thermometer is the chief factor in successful ensilage-making; and to the neglect of these few simple details the many failures may be attributed. An ordinary floating dairy thermometer is the most convenient type to use, an iron pipe of slightly larger diameter being built into the middle of the stack in a vertical position. The thermometer may then at any time be lowered by a string, and the temperature taken at any required depth.

HOW TO BUILD THE STACK.

Having selected a convenient and perfectly level site, a thick layer of straw should be laid down as a foundation, the size and shape being governed by estimating that for every 3 tons of hay the crop would have produced about 10 tons of silage may be reckoned on. Having arrived at an approximate estimate of the weight, the base measurements should be somewhat as follow:—For 15 tons, 9 feet by 9 feet; 20 tons, 10 feet by 10 feet; 50 tons, 13 feet by 13 feet; 100 tons, 16 feet by 16 feet.

Only as much of the crop as can be carted and stacked in one day should be cut; a day or two should then elapse before adding more material. This allows the temperature to rise, and also the mass to subside, which facilitates the work of stacking. In an ordinary hay-stack the sides are built projecting outwards—this must be carefully avoided in building silage-stacks. It is far better to have the sides and ends inclining inwards; there is then less tendency for the stack to lean over, which frequently happens, owing to the fermentations causing unequal settling of the mass. Should this occur, props must be set—at a wide angle—to the leaning side, when, on further subsidence taking place, the pressure brought to bear will bring the stack back to the perpendicular.

From the first load to the completion of the stack the greatest attention should be paid to the outside edges. This is a very important point. The outsides should always be kept higher than the centre when stacking, and should be made much more compact by being well trodden down, the centre being left comparatively loose.

When finished, the top should be levelled, and covered with a layer of straw, pressure being then applied by piling the handiest material procurable on the top, so that a deadweight of about 1 cwt. per square foot is secured.

MR. GRUEBER'S SILAGE.

Any succulent growth, so long as it contains nothing deleterious to stock, may be made into good ensilage, or special crops may be grown for the purpose.

Mr. Grueber sowed an early variety of Yorkshire Hero peas, and these were pulled and marketed in the ordinary manner. A start was then made by cutting and carting on the same day a portion of the remaining haulms. These, it should be mentioned, were absolutely overrun with the small bindweed (*Convolvulus arvensis*) and a quantity of other weeds, notably fat-hen. However, "the more material, the more ensilage," as Mr. Grueber pertinently remarked, so everything was carted and stacked. This work extended over fifteen days, being carried on as opportunity permitted, so as not to interfere with more important matters. An iron pipe was built into the stack for use with the thermometer. A necessary precaution was a fence round the stack, as, once stock have acquired a taste for ensilage, it is a troublesome matter to keep them from rushing it, no matter how good the surrounding feed. Horse-beans, badly infested with aphis, were also placed in the stack. Then pressure was applied, which consisted simply of a dead weight in the shape of old timber, beams, &c., to the extent of about 12 cwt. Stacking was commenced on 29th December, 1902. The following day the temperature was 90 degrees Fahr., and on the 31st 130 degrees. The maximum temperature reached was 150 degrees, and a gradual fall then took place, until, at the end of January, 1903, 130 degrees was registered. No further records were made, but the fall in temperature would naturally continue until the normal was reached.

Here, then, we have a stack of ensilage consisting practically of what may be termed the refuse of a pea crop and a worthless crop of beans, built at no expense, and no pit, silo, or mechanical press used. Yet, when opened, the ensilage proved to be of high quality. I have shown samples of this particular stack to members of Branch Boards and others at my recent lectures, and Mr. Grueber is good enough to say that he will be pleased to show the result to anyone interested who may care to call upon him.

Another successful ensilage-maker is Mr. Thos. Barwick, of Lambton Farm, Moonah, who sows a special crop for ensilage purposes, and last April put in about 1½ bushels Algerian oats, half a bushel of wheat, and half a bushel of tares, the crop being cut when in flower, at the latter end of November. Mr. Barwick considers that he can feed three head of cattle on ensilage, as against two made into hay. The previous year no ensilage was made, owing to the premature ripening of the straw through want of rain. Mr. Barwick estimates the loss in milk from this cause at 2 quarts per cow per day.

TO PREVENT BUNT.

In the State of Wisconsin, U.S.A., the following remedy has been attended with great success:—

Take one pint of formaldehyde (40 per cent. is considered standard), and put it into a cask containing 36 gallons of water; stir thoroughly. Next fill a porous bag with the seed, and submerge it in the solution for ten minutes; then lift the bag from the cask, and allow it to drain for a while, in order to save the solution. Empty the grain where it will not be likely to be again infected with the spores of the bunt, and shovel over at intervals until dry. The solution recommended above is not poisonous to farm animals, and does not injure bagging or clothing. Some 40 or more bushels of seed can be treated with the solution made from one pint of formaldehyde. Oat smut and barley smut can be combated in the same way. The Jensen hot-water treatment is recommended by a good many authorities, but this process involves the employment of a thermometer, and, unless specially inquired for, it may be left alone. Some seven years ago, we supplied particulars as to temperatures and time of immersion, and received intimation from a farmer that the process had killed his wheat, and he would have to re-sow. Later on he wrote to explain that the thermometer employed was faulty, and, in his opinion, he had boiled his seed.—*Agricultural Gazette of Tasmania.*

VISIT OF A VICTORIAN LEGISLATOR TO THE QUEENSLAND AGRICULTURAL COLLEGE.

Among the recent visitors to Southern Queensland is Mr. W. S. Keast, M.L.A., who represents the agricultural districts of Dandenong and Berwick in the State Parliament of Victoria. Mr. Keast has shown his interest in this State by making two or three visits to it, and he is by training and inclination a gentleman who takes great interest in agricultural affairs.

On 15th June, at the invitation of the Minister for Agriculture (Hon. D. H. Dalrymple), Mr. Keast, Mr. Howard Willoughby, and Mrs. Keast and Mrs. Willoughby, paid a visit to the Agricultural College at Gatton. "I was very pleased with the College," said Mr. Keast. "There is nothing approaching it in Victoria. The methods of instruction are up to date, and so far as I could see the instruction given should equip the students to take up the positions of farm managers or station managers, or to go on the land on their own account. Mr. Mahon, the principal, I think is a very capable man, particularly in all that relates to the butter industry; I have never been in a machinery shed where there was more up-to-date machinery. There there is everything in machinery that the agriculturist can want. I also think the Government deserve great credit for their choice of the land. There are three qualities—a certain amount of poor land, a certain amount of sandy land, and a certain amount of rich alluvial. Having these different classes of land to deal with, the students get a practical experience of the conditions which they are likely to meet with on private farms, and this is undoubtedly a great advantage. In Victoria poor land is too often selected for the site of agricultural colleges. I was rather surprised to find that there are no milking machines here. In Victoria these are used in all big dairies with great success. Generally speaking, the college is very much on the same style as the Hawkesbury College in New South Wales, though not on so big a scale. There are some matters of detail in which improvement might be made, but taking the college as a whole I think it is a great credit to all concerned in its management. What I especially liked about it was the cleanliness everywhere observed, even in the care of the pigs."

Dairying.

DEHORNING CATTLE.

Humane people who live in towns, who have had no practical experience with stock, and who have not even seen horned cattle being trucked, speak of dehorning as a cruel operation. This is not so. It is an act of mercy to prevent cattle from injuring each other when they are collected together in numbers, and more especially when they are packed in open trucks and conveyed several hundreds of miles by rail. One has only to watch the cruel goring constantly going on amongst these unhappy beasts, rendered savage by their long confinement in a cramped standing position. When cattle lived in a wild state, and had to defend themselves against the attacks of wild beasts, horns were, no doubt, indispensable to them. But in the present day, and particularly in Australasia, where there are no fierce lions, jaguars, pumas, tigers, or wolves to contend with, where cattle and sheep roam about the plains in perfect security—except perhaps when native dogs take a few young calves—there is absolutely no necessity for horns, and it is merely humanity to remove them. The loss of the horns has a great influence in quietening wild cattle. On stations where there is mountainous, scrubby country, there is a certain number of wild, untractable animals, which select such country as their feeding grounds, and become leaders of wild mobs, which give great trouble to stockmen at mustering time. When any of these are yarded, it is the general practice to saw off a portion or even the whole of their horns, which has the effect of completely altering their disposition from aggressiveness to timidity, with the result that they leave the flash mobs and attach themselves to quieter companions. They then fatten much more quickly and kindly than when in their wild state.

It is quite within the bounds of probability, from the many known instances of heredity in perpetuating mutilations, that a polled breed of cattle would ultimately result from the practice of dehorning; but, to attain that end, it would be necessary that all bulls, as well as cows, in use in herds should be dehorned. In the great dairying districts of Illinois and Minnesota, in the United States of America, quite one-half of the dairy stock is deprived of horns. A farmer there stated that dehorning made his cows more gentle and docile, and that he noticed an increase in the milk since it had been done. Nature herself is working in that direction. Consider the great Texas steers with their four-feet-long, cruel, pointed horns. These animals often have to fight for their lives. Then turn to the gentle Jersey cow, which is a confiding friend of man, with no more dangerous enemy to contend with than an infuriated house-fly. This docile little cow has small, almost useless horns, about 4 inches long, and these Nature will doubtless eventually eliminate.

Removing the horns, when it is properly done, is not a painful operation, as is evidenced by the fact of its scarcely interfering with the flow of milk as much as a chase round the paddock in front of the farmer's dog will do. Those best acquainted with dehorning and its results are its strongest advocates.

This is what an official bulletin issued from the Maine (U.S.A.) Experiment Station states:—

Dehorning is to be recommended, because dehorned cattle are more easily cared for than those with horns. The best time to perform the operation is during cold weather, when there will be no trouble from flies. To dehorn mature animals, use clippers that will remove the horn perfectly at a single stroke and in a moment of time. With suitable clippers, properly used, the operation is simple and very quickly performed. Animals do not give evidence of great suffering as an effect of dehorning. The tissues injured in dehorning are not very well supplied with nerves, and they are quickly cut through. Good evidence that dehorning is not very painful is the fact that cattle will resume feeding immediately after being operated on, and the yield of milk in cows is not perceptibly affected. Compared with castration of colts and calves, dehorning may be considered painless.

To prevent the growth of horns, calves under three weeks of age can have the embryo horns removed with one stroke of a sharp knife, or they can be treated with caustic sufficiently powerful to destroy them. In the past, efforts have frequently been made to prevent the practice of dehorning on the ground that it caused needless pain. It would seem to us that efforts can now better be expended by endeavouring to have the last relic of a horn removed from our domestic cattle, who ceased to need them when they came under the protection of man. Horns may sometimes be ornamental, but it is evident that they are usually useless, expensive, and dangerous luxuries.

It is absolute kindness to dehorn young cattle by means of the application of caustic potash to the embryo horn of the calf of two or three months old.

The following instructions for the removal of the calf's horns have been issued by the Board of Agriculture, London :—

"Clip the hair from the top of the horn when the calf is from two to five days old. Slightly moisten the end of a stick of caustic potash with water or saliva (or moisten the top of the horn-bud) and rub the tip of each horn firmly with the potash for about a quarter of a minute, or until a slight impression has been made on the centre of the horn. The horns should be treated in this way from two to four times, at intervals of five minutes. If, during the interval of five minutes, after one or more applications, a little blood appears in the centre of the horn, it will then only be necessary to give another very slight rubbing with the potash.

"The operation is best performed when the calf is under five days old, and should not be attempted after the ninth day.

"Caustic potash can be obtained from any chemist in the form of a white stick. When not in use, it should be kept in a stoppered bottle in a dry place, as it rapidly deteriorates when exposed to the air.

"One man should hold the calf while an assistant uses the caustic.

"Roll a piece of tinfoil or brown paper round the end of the stick of caustic potash, which is held by the fingers, so as not to injure the hand of the operator.

"Do not moisten the stick too much, or the caustic may spread to the skin round the horn and destroy the flesh. For the same reason, keep the calf from getting wet for some days after the operation.

"Be careful to rub on the centre of the horn, and not round the side of it.

"Caustic potash is *poisonous*, and must therefore be kept in a safe place."

In using caustic potash, great care must be used to avoid the danger of injuring the animal's eyes. To this end, a farmer of experience succeeded in finding a substance which would give consistency to a solution of potash, and yet not reduce its strength. The substance is black oxide of manganese. In preparing the mixture, fill a phial about half full of the oxide; then finish with a saturated solution of the caustic potash. The calf should not be more than three weeks old, and the earlier the better. Shake the bottle well for each application, as the ingredients will separate.

A few years ago (1898) we described an apparatus and a crib for dehorning cattle, designed by Mr. Armstrong, agricultural manager for Mr. John Gubbins, of Bruree, Limerick, Ireland. By the use of these, a two or three year old bull may be dehorned in four minutes. The actual time taken to cut the horns is only 40 seconds. From beginning to end of the operation no ropes or tying materials of any kind are required. This mode of dehorning is also illustrated on p. 20 of Vol. II. of the *Journal*.

At the half-yearly meeting of the Dairymen's Association of Victoria, held in May last, Mr. J. Thornton (Cobden) said he quite agreed with the remarks of the President regarding the dehorning of cattle. Dehorning was not a cruel operation. It was noticeable that after the operation cows did not "go off" their feed, and this was a sure indication that not much pain was caused. Far more cruelty was suffered by cattle when they were gored by vicious horned brutes. He moved—"That the Minister for Agriculture be asked to introduce a Bill at the earliest opportunity providing for legalising of dehorning of cattle in Victoria."

Mr. A. Byrne (Moyhu), who seconded the resolution, instanced a case where he had dehorned a bull that was a famous "gate smasher." Not having the proper dehorning instruments, he used a saw in removing the horns. The bull did not appear to suffer much pain, as, bar the loss of the horns, there was nothing to be seen wrong with him.

Mr. J. Williams (Kongwak) doubted the wisdom of legalising the dehorning of cattle. He had heard of an instance where seven head of cattle died after being dehorned.

The President said that several of his neighbours had dehorned their cattle, and the effects had not been more severe than other necessary operations performed on farm stock. The operation, when properly performed, was both simple and quick. The experience of those who dehorned cows was that there was very little shrinkage in their milk yield. On the other hand, they all knew that cows, when horned by the "bully of the yard," suffered very much, and "went off" in their milk.

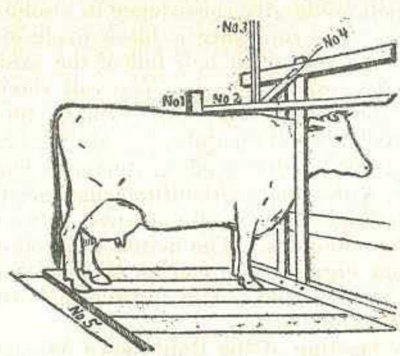
The motion was then put and carried.

Writing to the *Agricultural Journal* of the Cape of Good Hope, a correspondent says:—

My sons have at different times dehorned a good many of our heifer calves, and I have never known a single instance when sores have resulted from the operation. This season about 50 calves have had caustic potash applied to the horn buds, and, as far as we can judge, for a short time it seemed to cause a little irritation. It does not affect their appetites, however, and in a few hours they are as happy as the bull calves that have not been operated on. Your correspondent must have been too lavish with the caustic to cause sores, and where the operation was not successful must have applied too little. We have found the application of caustic potash very effectual, but it must be applied when the calves are young, under six weeks old. The operation of cutting off the young horns when the calves are older has not proved quite so satisfactory. Dishorned cattle seem to me to grow a little larger than those that are allowed to grow horns. I have not noticed that it affects their milking qualities.

KEEPING COWS CLEAN.

The illustration shows a cow stall in actual use. The contrivance over the shoulder of the cow is the unique feature. Cows, when urinating, naturally arch

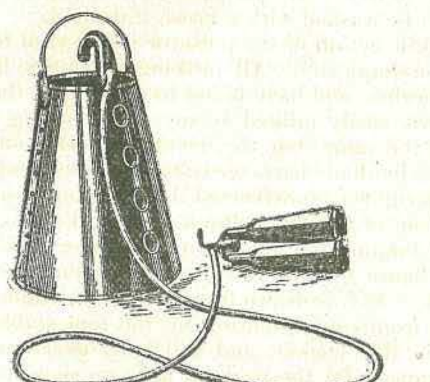


the back, and if confined by rope or stanchion will crowd as far ahead as possible, thus allowing their waste to fall exactly where they would stand when feeding. The little device shown in the illustration in no way interferes with the arching of the spine, but does force the cow to draw back instead of pushing ahead; thus the gutter at back of the cow catches the filth, and the floor remains clean. There is no rule to give for the exact placing of the structure, as different breeds of cattle differ so in height and length; however, piece No. 2 should be located just back of upper point of shoulders, and from $1\frac{1}{2}$ to 2 inches above the back. This gives a chance for free movement, and in no way interferes with the comfort of the cow. No. 1 is a block on which to fasten No. 2. No. 2 is the upright, which should extend to the joint above, and there be fastened. No. 4 is a brace for the support of the frame, and should be nailed very firm, as the cow will break the trap if she can. No. 5 is the gutter.—*Station, Farm, and Garden.*

THE SHARPLES' MILKING MACHINE.

Amongst the successful milking machines should be included, judging by the description of the machine furnished to Hoard's *Dairyman* by the Sharples Company, the machine of that name.

The matter of a mechanical cow milker is one of deep interest to all dairymen. Many attempts have been made in this line, but for some reason all efforts heretofore have failed to produce a milker that was satisfactory. For two years



past rumours have been current that the West Chester, Pennsylvania, Sharples separator people were working on the problem. A week or two ago an advertisement appeared in the *Dairyman* calling the attention of the public to the Sympathetic Pulsating Lactator, and there is hope that the knotty problem has at last been solved.

Mr. Sharples writes on his milker:—The mechanical devices put on the market have been mostly of two classes. One of them extracted the milk by suction only, and while it might do reasonably well on a hard-milking cow for a season, it very soon makes the teats sore on an easy milker, and its use has been abandoned, because there was no method to regulate the work. The other plan is to extract the milk by mechanical compression of the teat, and it will not work successfully. No two teats are alike in shape, and a mechanical contrivance cannot be produced that will fit all of them.

The calf is the best cow milker that was ever invented. It combines both of the above methods, and, in addition, pulls hard on the hard milker and lets up a little on the easy one.

The Sympathetic Pulsating Lactator, manufactured by the Dairy Specialty Company, of West Chester, Pennsylvania, has used the motions of the calf as a copy. It works hard on some of the cows, and is quiet and gentle on others.

The machine can be used to best advantage with a dairy of 50 cows or over, as it requires an engine or other power to drive it. A vacuum air pump is located at some near-by point convenient to operate it. From this a line of iron gaspipe is run above the cow stalls in the milking-shed. The only service of this pipe is to exhaust the air in the milk bucket, no milk or other liquid being run through it. A small branch is fitted over each stall, and is formed into a hook on which the milk bucket hangs, a foot or two above the cow's back.

The bucket is airtight, the top being closed with a lid, which is clamped securely into place by the simple act of raising the handle to lift the bucket. The mere hanging of the bucket on the hook is all that is needed to make the connection with the air pipe.

The teat cups are seen on the right-hand side of the picture attached to a rubber tube, and in the centre of them a small valve no larger than a hen's egg, where all the regulating is done automatically. A turn of the handle under the valve sets the machine to work, and the resulting suction holds it in place until it is removed after the milking is finished. The valve and teat cups weigh but 33 oz., and one man can use four or five of them to advantage on a string of cows. By the time he has the fourth one in place the first has finished its work and is ready to put on a new cow. In this way one man can readily do as much work as four milkers, and do it more satisfactorily to the cows and to himself. The cows do not object, but seem to enjoy the operation. The machine is easy to wash. When work is done, clear, cold water is sucked through it a few minutes, and it is set away to dry. All the parts of the buckets and milkers are easily accessible, and can be washed with a brush if desired.

The sympathetic action of the pulsator is the vital feature of milking never before attained mechanically. All milking machines have previously treated one cow just as another, and have failed to respond to their individual peculiarities. The sensitive, easily milked Jersey and the big, beefy Shorthorn have been treated just the same, but the lactator works on each cow differently, according to her individual characteristics. The teat cups are new and novel in their action. The cup is so constructed that it collapses at the top first, and after compressing the root of the teat follows down and strips the milk from the rest of it. The use of the machine makes much cleaner milk. It cannot get dirty; the cow has no chance to kick the bucket over, nor can the operator wet his fingers in the milk. As it is drawn from the cow the milk is in an airtight bucket and entirely free from contamination by the foul stable odours. It is carried from the stable in this bucket, and will keep sweet much longer than under ordinary circumstances, for the bacteria have no show at it in the stable.

The machine when in operation makes little noise—only a pulsation each time it takes breath. The harder the cow is to milk the harder and longer is the breathing, this being regulated automatically. It takes from 2½ to 10 minutes to milk a cow, and one man can readily handle 50 of them. The machines are not expensive, and can be operated by any farm hand of ordinary intelligence. They milk a cow clean, and do not have a tendency to dry up the flow.

ANGORAS IN THE CENTRAL DISTRICT.

We are indebted to Mr. H. Missing, of Talegalla, Tiaro, himself a successful breeder of Angoras, for the following useful information supplied to him by a gentleman on the Dawson River, Central Queensland. The latter writes:—

"I think the half-breds are worth shearing. They will cut about 3 lb. if shorn before the end of August; if you leave it later, all the hair will fall off and be lost. The highest price we have ever obtained for the hair was 8d. per lb. in Sydney, although it was fairly good. I believe the hair is really worth about 3s. per lb., but for these small lots they give you just what they like. I have no doubt that in large quantities it would sell much better.

With us they only breed once in the year, about September. The kids, we find, must be shut up every day until they are a good size, as they sleep on the run. The mothers follow the flock, and seldom return to look for their young, consequently lose them wholesale. The best way is to draft off all the kids in the morning, when the goats are let out. You can soon teach the mothers to return to them at mid-day. After they have had a suck they will sleep, and the mothers will go to feed again. In a few days you will find that you have no trouble in drafting off the kids; they will not try to leave the yard. Our bucks always live with the flock, but you hardly ever see a kid out of season; they all come about August or September; they tip about March and April. The three-quarter or pure goats are very handsome. We have the skins tanned and dyed different colours. The flesh is quite equal to any mutton, and the wethers get very fat, and sometimes weigh up to 100 lb. (*sic*).

To this Mr. Missing adds:—

My own experience hitherto has not reached half that weight, but I hope with the assistance of Wellington and the South Australian bucks to not only improve the quality, but to increase the size of the flock. They still adhere to their regular habit of coming home about half-past 3 or 4 o'clock; they also seem to have an idea, not as Tennyson says in "The Lotos Eaters," that it is always afternoon, but that it is always Sunday morning, and unless I kick them out of the yard, after breakfast, they will lie basking in the sun till 11 or 12 o'clock, though the gate may have been open for hours. They are certainly not so greedy as sheep, or they require less feed to keep them in condition. They are putting on their winter coat, and present quite a different appearance to what they did in the summer. The fleece is curly and lustrous, and they have a peculiarly soft, downy feeling when handled; even my old friend Saltbush Bill, though by no means one of the best looking, has developed a fleece that feels like floss-silk, probably owing to his diet of jam tins and oyster-shells.

THE MARKETING OF MOHAIR.

Within the last year or two considerable attention has been paid in this State to the rearing of Angora goats, and numbers of these valuable animals have been brought into Queensland to form the nucleus of future flocks. Under present circumstances, the question of marketing mohair has not been much considered, but the time is not far distant when growers will have to devote their attention to this important matter. There are few, if any, of our growers who are experienced in the mohair market; we therefore deem it necessary to introduce the subject now. We take from the *Agricultural Journal* of the Cape of Good Hope the following excellent article on "The Marketing of Mohair," by Mr. S. B. Hollings, which first appeared in the *Midland News*. The author of the paper embodies in it

PRACTICAL POINTS FOR GROWERS.

He says:—I read with considerable interest the remarks made at the annual meeting of the Zwart Ruggens Farmers' Association, and the lively and practical way the members tackled the subject of the sale of mohair gives one the impression that they mean business. It has always been considered one of the fundamental principles of sound business that an article should be well sold in order to make that business profitable, but the revelations made at the meeting helped to confirm the universal testimony that in some things at least, and especially in wool and mohair, South Africa is behind the times. When a first-class goat farmer acknowledges to having sent to Port Elizabeth a good clip of mohair and the same is sold along with 300 other bales more or less inferior stuff, and certainly badly packed, it proclaims from the house-tops that something is radically wrong, and the need for reformation in the sale of mohair is certainly urgent.

The remarks made by all the speakers show conclusively that they are not done justice to by Port Elizabeth agents and brokers, and I think that the Zwart Ruggens Farmers' Association never did a grander day's work than when they discussed this burning question. Before writing a single word, permit me to say that I hold no brief for any broker or buyer either in Port Elizabeth, Bradford, or anywhere else, but I do strongly object, on the ground of principle, to any man's produce, be that produce in the hands of grower, dealer, or manufacturer, not realising a fair market price, and the only motive I have in looking at this subject is to try to get the industry on to a fair and square basis.

MOHAIR SHOULD BE SOLD ON ITS MERITS.

The sale of mohair from grower to user is a matter in which mutual interests are wrapped up, and both are indispensable factors in commerce. It is the grower's work to produce the article the manufacturer wants, and then for the same to be put before the manufacturer in the most attractive way possible. The manufacturer or mohair merchant has a perfect right and is certainly justified in trying to get his mohair as cheaply as possible, but there is no gainsaying the fact that every parcel of mohair should be sold on its merits, and when this is not done full justice is not done either to the best or the worst qualities of mohair. To me the statement is astonishing that a score of growers' clips should be all jumbled together and sold as one parcel. The idea seems to me to be preposterous, unless all the various clips were of equal quality, lustre, length, and condition, and, if the character of Cape wool is anything to go by, I cannot help but think that there will be a wide range of difference, for there are seldom two clips of wool alike. The Port Elizabeth buyer or representative for some Bradford firm might want to buy a big line all at once, but from the grower's standpoint this is a very bad policy, and is bound to continue the practice of storekeepers or careless farmers packing all the mohair into the bales just as it comes off the goat regardless of character and condition. Such a policy is bound to be ruinous to the Cape mohair industry. The inequalities of the situation are bound to continue, and little encouragement can possibly be held out when such a system of selling is allowed to continue.

There can be no disguising the fact that it is the object of the buyer, whether he be in Port Elizabeth, Chicago, or Sydney, to secure mohair as cheap as he possibly can for the firm he represents, and very likely his abilities will be largely determined in the eyes of the firm he represents by the securing parcels of mohair at a price well under present market rates. I have now had a long life experience in connection with the Bradford trade, and am open to make a confession that every Bradford or Continental buyer of wool and mohair that goes out to Australia or Cape Colony goes out with no other object before him than to try and get produce fractionally cheaper than he can buy the same in such a distributing centre as London. I do not say that this object is always accomplished, but it is known that competition is not so extensive in point of numbers as it is in a market like London.

"Rings" have been spoken about as existing in colonial markets; and when there are only half a dozen to a dozen buyers for an article, to form a buyers' "ring" and all to agree on one common basis of action as well as prices is as easy as possible; but when there are fifty buyers and upwards, and a good article is placed before them, competition is always keen and sustained, full market prices under such conditions being always forthcoming. For big lots of mohair to be sold as one lot may be more expeditious to the broker, but it does not give adequate terms or prices to the owners of the best parcels in that lot, for experience tells me that an average price under such conditions is always struck, the grower of the best mohair suffering, while the careless, indifferent grower reaps the benefit of another man's push, energy, zeal, and care in breeding.

GROWERS MUST APPEAL DIRECT TO USERS.

This subject of selling mohair appeals specially to growers in the United States and Cape Colony. However zealous breeders may be and desirous of turning out the best fleeces they possibly can, unless they receive compensating prices the industry cannot push along as it ought to do. It seems to me that the question resolves itself into this: How or by what means can the actual consumer be brought into close touch with the grower, and *vice versâ*? The answer to me is easy and simple. In the case of the United States, growers have their own users in the manufacturing districts of their own country, where direct sales can be negotiated easily. In the case of growers at the Cape, this is not so, and conditions are consequently more difficult and trying. But the problem can be solved, and solved readily.

The way wool is sold in London offers to every grower throughout the wide, wide world a magnificent object lesson of how his produce is and can be sold. If a farmer's clip of wool is no more than a single bale, that clip is sold on its own merits, and on its own intrinsic qualities it fetches a full market price. This in my opinion is the only satisfactory way in which Cape mohair will be sold in the future, and not until it is shipped to England and the manufacturer and user appealed to direct, and given the chance of buying first hand, will this problem be satisfactorily solved. Experience tells every man that when any kind of produce has to go through two or three hands every person has to "milk" a certain percentage of its value in order to live and make a profit, and a mohair-grower, whether he be an American or South African, has equally as much right to obtain the best price he possibly can for his produce as any other seller. Some may raise objections to this line of action. Let us, therefore, consider the most prominent of them.

OBJECTIONS ANSWERED.

It is always wise to consider the opposing forces when a new scheme is decided upon: let us do so here. The strongest objection undoubtedly will be that of the local broker, and there is undoubtedly a great deal in the statement of Mr. E. R. Hobson when he said he knew of an instance where "they wanted to ship direct, but were informed that the hair must go through the regular channels of trade." No doubt the adoption of the line of action I have outlined would get up the backs of the trade, but what does that matter to a man that owes them nothing? If I owe my neighbour nothing, and am in no sense indebted unto him, and if I have an article to sell and he be in the trade, I consider I am perfectly justified in obtaining the best price I possibly can for that article. So with mohair. In Port Elizabeth there are situated a few buyers, but they do not represent by any means the full buying strength of the entire trade, for in addition to dealers and merchants there are spinners and manufacturers to contend with, which are invaluable in the wool and mohair trades. I could say a good deal here on this point, and only the etiquette of the trade and my intimate relations with several mohair-dealers here prevents me, but I contend this: That, if Cape or even American mohair was sold on the London market and the sale well advertised, there would be at least from three to six more persons present at that sale to every one buyer in Port Elizabeth or anywhere else. Not every user, by a very long way, is represented in Port Elizabeth, and these have to obtain their raw supplies from Bradford merchants, but if there was a good sale once or twice a year in London there would be present every Yorkshire dealer, spinner, and manufacturer, as well as Continental users of the article.

Several years ago there was a sale of Cape mohair in London at which I happened to be present. This took place during a series of London wool sales—the right time to have one—and I was really surprised at the number of buyers who were present. Since that time more people have begun to use mohair, and also it is finding its way into new channels of consumption and new fabrics which were not known five or six years ago, and now I make a suggestion to such bodies as the South African Mohair Growers' Association to give this matter sober consideration. American growers seem to be in "clover" and quite satisfied with the prices they are making at the hands of American manufacturers, but if there is any difficulty in its sale Bradford users are prepared to give a full market price for good, useful qualities.

TIME FOR ACTION.

Local conditions in Cape Colony I am not conversant with, but I do think it is high time that the members of the Mohair Growers' Association should insist on their clips being sold individually on their merits, and if this cannot be done satisfactorily in South Africa then let them be shipped to London, where every bale will be dealt with on its merits. There is a great stir among Angora goat men the wide world over, and the impetus can only be sustained by growers receiving a reasonable amount of patronage and support. Any London wool broker will only be too glad to sell either one bale or 500 bales on its merits, but if there is a concerted action on the part of a body of growers, and the same could dispose of, say, 1,000 bales of the very best clips that are grown in South Africa, then it would be a splendid advertisement for mohair-growers. The raw article will have to be sold like wool on its merits, and not till then will Angora goat-breeders receive all they are entitled to obtain.

SELECTING A BULL.

A gentleman, who has had long experience of farming in Ireland, says that he would never buy a bull unless he knew its dam and granddam. A farmer, speaking at the Ohio State Board of Agriculture, said:—I would not buy a bull to-day to use in a thoroughbred herd unless I knew his ancestors back three or four or even five generations. I do not simply want to know what his dam is. Succeeding generations of his dam may show improvement, but not from her own qualities alone. It comes from her inheritance, and that inheritance will very often in the bull come from three or four generations back.

THE BUTTER BILL.

The text of the Bill to Amend the Law with regard to the Sale of Butter, prepared and brought into the British House of Commons by the late Mr. Hanbury and Mr. Akers Douglas, has been issued. Its three clauses read as follows:—

1. It shall be unlawful to manufacture sell, expose for sale, or import any butter or butter mixture containing more than 20 per cent. of water; and every person who manufactures, sells, exposes for sale, or imports any butter or butter mixture which contains more than that percentage shall be liable, on summary conviction, to the penalties imposed by Section 4 of the Margarine Act, 1887, as amended by Section 17, Sub-section 2, of the Sale of Food and Drugs Act, 1899.

2. (1) The provisions of the Sale of Food and Drugs Act, 1875 and 1899, relating to margarine shall apply to any articles to which this section applies, but subject to the following provisions:—

(*a*) The expression "adulterated butter" shall be substituted for the expression "margarine" on any brand, mark, label, or wrapper required by the provisions applied by this Act, and for all other purposes of those provisions.

(*b*) Section 8 of the Sale of Food and Drugs Act, 1899 (which restricts the amount of butter fat in margarine), shall not apply.

(2) This section shall apply to butter to which any substance has been added whereby the amount of water in the butter is increased, but not to the article known as Irish salt firkin butter or to margarine, as defined by the Margarine Act, 1887.

(3) Any water in excess of the proportion prescribed for genuine butter by the regulations in force for the time being under Section 4 of the Sale of Food and Drugs Act, 1899, which is found in any butter or butter mixture shall for the purposes of this section be deemed to be due to the addition of some substance, unless it is proved to be due to the ordinary process of making butter.

Plate I.

Butter-making by Water-power.

3. (1) This Act may be cited as the Adulterated Butter Act, 1903.

(2) This Act shall be construed as one with the Margarine Act, 1887, and may be cited with the Sale of Food and Drugs Acts, 1875 to 1899.

(3) This Act shall come into operation on the first day of August, nineteen hundred and three.

An important deputation, representing the Cork Butter Market Trustees and Cork Butter Exporters' Association, and the agent of the Co-operative Wholesale Society of Manchester waited on the late President of the Board of Agriculture, at the House of Commons, for the purpose of impressing on him the desirability of abandoning his proposal in the above Bill to exempt Irish salt firkin butter from the 16 per cent. water standard. By this Bill, such butter is allowed a percentage of 20 per cent. water standard. The deputation pointed out that Cork and Limerick alone supplied the market with 52,000 firkins last year. Since there had been a self-imposed limit of 18 per cent. in the Cork market, the trade of that country had increased, whilst it had decreased in other parts of Ireland. The object of the deputation was to urge that the standard should be made a universal one. When the 20 per cent. standard was fixed, people stopped buying, and only returned when the 16 per cent. guarantee was given.

One member of the deputation said that in some districts a pernicious system once obtained. People bought the butter in bulk, took it into their manufactories, and applied brine to it with such a deftness that they became known as "Butter Glashers." Their whole object was to increase the weight. When butter was rejected it was taken away, and brought back again next day with the superfluous moisture pressed out.

Mr. Hanbury was not quite sympathetic with the deputation, considering that this butter was made by the poorest of the poor in Ireland, and that it would be cruel to force a standard on them all at once, and so knock their industry on the head.

After some further discussion, Mr. Hanbury asked the deputation to supply him with some statistics concerning the salt firkin trade throughout the country. He did not want any more information concerning Cork, but what he did want to get at was the amount of trade actually done in Ireland in this article, and the proportion that it bore to that done in Cork.

BUTTER-MAKING BY WATER POWER.

The accompanying photo. shows a water-wheel shaped out of odds and ends about a farm in the New England district. Though primitive in construction, the little contrivance proved a great labour-saver when applied to the process of butter-making, and was so fitted with spring and rachet that immediately the butter had formed the rotation of the churn-crank ceased.

During a slight flush in the water channel, the power increased sufficiently to drive an ordinary stand grindstone of 12-inch diameter.

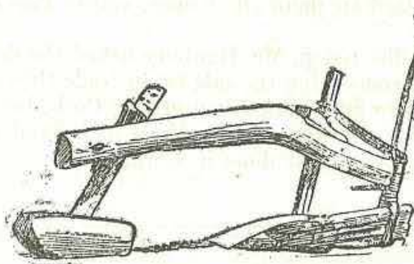
SWINE FEVER.

Writing on the subject of swine fever, or hog cholera, an American paper suggests that the disease may be stamped out eventually by sanitary measures. There are a few large and constant growers of pigs in the great corn-producing belt of the United States, who have never had a sign of the disease in their herds, notwithstanding the fact that at times in the past years it was raging all round them in a most virulent form. They do not specially say how they have avoided the disease, except to explain that they do not feed corn heavily during such periods, give their hogs more green and succulent foods, are careful to see that hogs have pure well water and are kept entirely free from filth, and on their own premises. In a word, they observe sanitary rules as perfectly as they can, and, by feeding less heating concentrated foods, increase succulent foods, thus insuring better digestion and a healthy condition generally. It is no doubt true that with the lower animals, as with man, that they contract disease when the germs are prevalent, if they are kept in a filthy condition, and thus become susceptible to disease. Under such conditions, medical advice to men is to be careful about what they eat, and to keep the house and its surroundings pure. The hog is but another form of the animal to which these rules are applicable. Sometimes men are careless and consider themselves immune to disease even in periods of its prevalence, and fall victims to their folly. How much more is this true respecting the hog!

No doubt it is these common-sense observations that have enabled some growers to entirely escape hog cholera in their herds, when those around them have been sufferers from it. It takes a long while and many object lessons to bring about better conditions, but we believe the farmers are advancing along these lines.

A CHINESE PLOUGH.

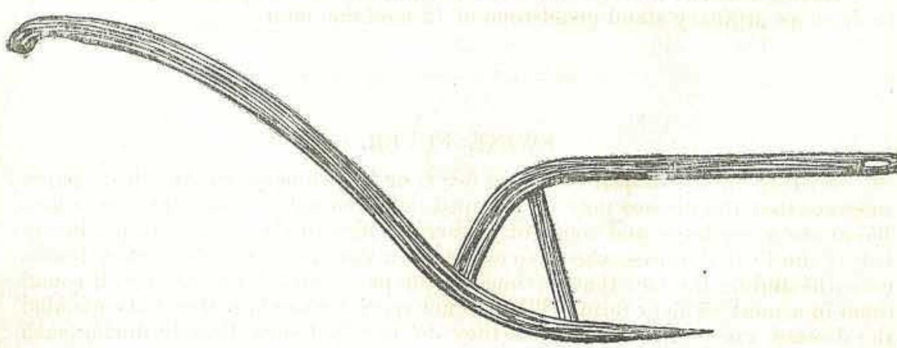
Here is a sketch of a Chinese plough such as is used at the present day in many parts of the Celestial Land—



This plough is a type of the farm implements now considered good enough by Chinese farmers to grow wheat with. What will they likely be content to grow wheat for when up-to-date implements are put in their hands is a question that ought to occur to farmers here.—Ex.

As a comparison, we illustrate also the usual type of—

THE ARAB PLOUGH.



The Horse.

HOW BRITISH HORSES ARE PREPARED FOR EXHIBITION.

Whether horses are exhibited at a large show or merely at a local fixture, it is necessary to get them into some sort of show condition if they are to be at their best in the show-ring. A considerable amount of skill and knowledge is required in order to obtain proper show condition in a horse, and the routine of preparing horses for show purposes has been brought to a high pitch of perfection by those who make a business of exhibiting horses. As a matter of fact, show condition does not in any way add to the intrinsic value of a horse; a good horse always is a good horse, no matter what may be his condition. But this is frequently overlooked by the judges, and the fact of an animal having been carefully prepared for the show-ring counts greatly in his favour, and adds materially to his chances of getting within the prize list. Show condition hides a multitude of defects, and the intending exhibitor will do well to bear this in mind, and to act accordingly if he wishes to be successful.

Show condition requires that the horse should carry an adequate amount of flesh, and this is obtained by suitable feeding. Frequently fat is made to do duty for flesh, but a horse which has merely been fattened up on fattening foods, but whose muscles have not been developed sufficiently, cannot compare in point of appearance with the horse that carries firm flesh, and whose muscles are large and prominent. We do not want a horse to appear like a fattened bullock or heifer, with a uniformly sleek appearance over the whole of the body, and with all natural depressions evenly filled up with fat, so that the body looks level. What we want are firm flesh-muscles, and as much of these as possible. The contours of the body should be well rounded off in graceful lines, but they must not be obscured by fat. The various muscles should be prominent, because muscular development—not fatty development—increases the good appearance of a horse.

EXERCISE.

Whilst feeding the horse well on oats, we should give a sufficiency of exercise at the same time, in order to develop the muscles, and to keep the legs fine. High feeding, without adequate exercise, will cause filled legs, and, whilst it causes the animal to get fat, it does not in any way increase the muscular development. Moreover, highly-fed horses are bound to go off their feed sooner or later if they are kept shut up in the stable.

If we keep the horse perfectly healthy, and prevent the system from becoming heated by giving laxative food when required, the coat is sure to have a good bloom on it. Glossiness and shortness of coat are, it need hardly be said, absolutely essential in a horse properly got up for show. In regard to this point, it is first of all necessary that the horse should be in perfect health; but there are secondary means by which the gloss on the coat can be improved, chief amongst which is a thorough and plentiful grooming. Strapping is the best way of getting a lasting shine on the coat, and it, moreover, serves to keep the latter clean and short; hence elbow-grease is one of the principal aids in conditioning a horse for the showyard. In order to heighten and increase the good effects of strapping, the animal must be clothed while in the stable. The clothing must not be too heavy, specially in warm weather, because the horse is liable to sweat under heavy clothing, which is very undesirable. A fairly thin woollen rug or sheet is ample in spring once the horse has got his summer coat, while in summer thin cotton clothing is all that is required.

GETTING GLOSS.

Certain foodstuffs, such as linseed and linseed cake, are useful for imparting a rich gloss to the coat, and for keeping it in an oily and good condition; but it is not by any means requisite that these should be used, although they are often resorted to. A liberal allowance of oats, adequate exercise, plenty of strapping and grooming, and a rug or sheet will ensure such a gloss on the coat—provided the horse is in healthy condition—that it is impossible to improve it by any special dieting. If the coat is harsh and rough, and does not possess a satisfactory bloom, a little linseed meal or linseed cake can be fed.

Linseed meal is, moreover, useful for keeping the bowels open, and is much relished by horses; hence a small daily allowance—say, ½ lb. or so—for horses that are being prepared for show is to be recommended. Shire horses should be given 2 lb. or 3 lb. of best linseed cake, in addition to their oats, in order to get them into good show condition, especially if they are low in condition when the preparation for the showyard is commenced.

Beans are too heating, and very frequently cause filling of the legs, and they are, therefore, best avoided. Good oats are the best corn by a long way. Bran mashes or some green food must not be omitted in the diet, and the bowels must be kept in a sufficiently relaxed state. The dung should be firm and properly balled, but it must not be hard or dry, nor dark in colour. It should be a good healthy colour and slightly moist. The state of the dung is a very good guide to go by in arranging the diet of the horses. It is of the utmost importance to keep the digestive organs in good working order, because, otherwise, the animal is sure to look more or less off colour, and to lack that bloom and glossiness of coat which are so essential in the show-ring. A supply of salt must be provided in the manger.

In the case of horses which are delicate feeders or which are bad doers, special care and attention must be bestowed on their feeding. The appetite must be stimulated and kept alive by giving small feeds at a time, and by adding some linseed meal or locust bean meal or spice to the corn. But the giving of spices or condition powders must not be overdone, as they will do more harm than good if made use of too lavishly. If sufficiently good show condition cannot be got by feeding oats in the case of bad doers, a goodly allowance of linseed cake may prove to be of advantage, or a couple of pounds of linseed meal given daily may effect a marked improvement. If this is thought too expensive, or does not have the desired effect, crushed maize might be substituted for one-third or one-half of the ration of oats, and the latter should be crushed. It is quite wrong to attempt to treat all horses in exactly the same way as regards food when getting them up for show. Some horses require different treatment to others, and this should be kept well in mind if successful results are to be obtained. So much for feeding. There are, further, some other matters that require attention.

DRESSING.

The mane and tail must be properly trimmed, the details of this matter depending upon the class of horse. In the case of draught horses the mane should be long and flowing, it being plaited in some manner or other when the horse is actually at the show. The manes of light horses, on the other hand, are kept trimmed pretty short and thin, or they are hogged. It is essential to keep the crest perfectly clean and free from dirt by frequent brushing. If the crest is allowed to get dirty itchiness may easily be produced, which will cause the horse to rub it, and thus spoil the look of the mane altogether. The same applies to the dock of the tail. If necessary, a tail-guard should be made use of if there is any risk of the horse rubbing his tail.

The mane should fall over to the off-side, and, in trimming it, it must on no account be cut—that would be fatal to its good appearance. The proper and only correct way to trim the mane is by pulling it. First of all, it must be thinned sufficiently, so that it falls over properly, and lies flat on the side of the neck. After that, it is shortened to the required degree by pulling the ends, care being taken to make the lower line of the mane perfectly straight and parallel with the line of the crest. In thinning the mane, the lower or inner hairs must be removed; the hairs on the surface should not be pulled. It is impossible to devote too much care to the trimming of the mane, because the removal of hairs which ought not to be removed will mar its good appearance completely, and the fault cannot be remedied. It is very desirable to trim the mane some weeks before the show, and it is best not to do it all at one time, but to thin it gradually during consecutive days. Once properly trimmed, great care must be exercised when combing it during the grooming process, so as not to pull out hairs, and thus to spoil the appearance of the mane. If the mane is to be hogged, the clippers should be run along the top of the crest, beginning at the withers, and working upwards, and keeping the machine pressed as close as possible against the crest. After that, the clippers are run along the two sides of the crest, and finally the fore-lock is removed.

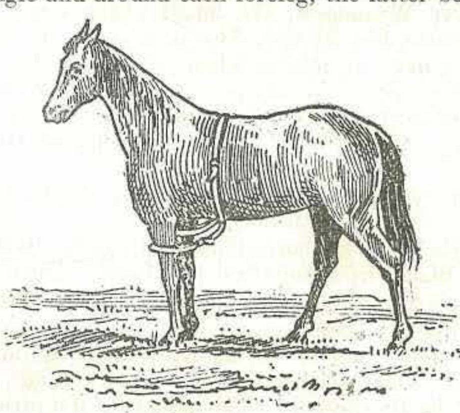
Feet and Deportment.

The feet also require attention. They should be carefully shod, and the shoes may with advantage be made pretty wide at the heels, so as to increase the apparent width of the foot, which will add to their appearance. In the case of hackneys and other horses that are apt to forge or click, the toes of the hind shoes should be bevelled off more or less, so as to obviate the risk of forging as much as possible. The fact of a horse forging badly does not make a good impression, but rather the reverse. If the feet are not of a very good shape, their appearance can be improved for the time being by using the rasp on the wall after the shoes have been applied. Some kind or other of dressing or oil must be applied to the hoofs in order to make them look well.

A very important point in preparing horses for the show-ring consists in training them to spread themselves well when standing, and to carry themselves well when shown in hand. They should be accustomed to noise and bustle, and taught to take no notice of these things. It makes a bad impression, and decreases the chances of the horse in question, if he will not lead properly in the ring, but prances about and refuses to show off his paces in a proper manner. Nothing is more annoying than the behaviour of an untrained and obstreperous animal in the show-ring.—Kisber.

TO KEEP A HORSE FROM JUMPING.

Some horses are difficult to catch when at pasture, and others are prone to jump. These objections can be overcome by simple means. A surcingle should be placed about the body of the horse, together with two short straps that pass through the surcingle and around each foreleg, the latter being buckled so that



when the horse stands upright the strap will fall about half-way to the knees. This arrangement, which allows the horse to walk quite freely, prevents its running as well as jumping. A similar plan is to connect the forelegs of a horse by straps secured just above the knee; but those who have tried both plans agree in a preference for the one shown in our illustration.—*Farmer and Stockbreeder.*

Poultry.

EGG-LAYING COMPETITION.

The egg-laying competition organised by the proprietors of the Sydney *Daily Telegraph*, and carried out at the Hawkesbury Agricultural College, came to a conclusion on 31st March, after having extended over a period of twelve months. The following is a summary of the year's test—excluding the breeds represented by less than three pens:—

Breed.	Total Number of Hens of Each Breed.	Average Yield per Hen—All Pens.		Average Yield per Hen—Best Pen.		Average Yield per Hen—Poorest Pen.	
		No. of Eggs.	Value of Eggs.	No. of Eggs.	Value of Eggs.	No. of Eggs.	Value of Eggs.
			s. *d.*		*s.* *d.*		*s.* *d.*
White Leghorn ...	30	145·8	17 $2\frac{2}{3}$	185·5	23 $4\frac{1}{2}$	117·5	13 $4\frac{5}{8}$
Black Orpington ...	48	142·5	17 5	171	21 10	103	13 $\frac{5}{3}$
Silver Wyandotte ...	24	142·5	17 $9\frac{1}{3}$	170	21 5	119	13 $10\frac{1}{2}$
Buff Orpington ...	24	134·5	16 6	146·8	18 11	115·5	13 10
White Wyandotte ...	18	113·3	13 4	133·8	16 10	87	9 $4\frac{1}{2}$

Of the breeds with only two pens in the competition, Buff Wyandotte averaged 135.9 eggs per hen, Buff Leghorns 111.8, Andalusians 111.5, Anconas 109, Minorcas 82.4.

The above table demonstrates that "breed" alone is not everything, but that the strain also has a marked influence. In other words, there are good and poor strains in all the laying breeds of fowls. The columns showing the highest and lowest averages are of special interest. It will be seen that in value of eggs the White Leghorns varied to the extent of 10s. per hen; Black Orpingtons, 10s. 3d., Silver Wyandottes, 7s. $6\frac{1}{2}$d., Bluff Orpingtons, 5s. 1d., and White Wyandottes, 7s. $5\frac{1}{2}$d. The difference in the value of the eggs would, in every instance, mean the difference between profit and loss.

Another point of interest is that while the White Leghorns occupy the first and second places on the egg record, they are only third in the average value of eggs laid—viz., Silver Wyandotte, 17s. 9d., 1-3 per hen; Black Orpington, 17s. 5d.; White Leghorn, 17s. 2d., 2-3. This is, of course, due to the fact that the latter laid a large proportion of eggs when prices were lower. The position occupied by the Minorca pens is a very poor advertisement for the two strains of this breed which took part in the competition.

The records of the first four individual pens of six hens each are as follows:—

Grantham Poultry Farm—Rose-comb White Leghorns laid 1,113 eggs, valued at 140s. 3d.

Mr. G. Kennedy's White Leghorns laid 1,041 eggs, valued at 126s. 2d.

Mr. M. Ward's Black Orpingtons laid 1,026 eggs, valued at 131s.

Mr. A. E. Henry's Silver Wyandottes laid 1,020 eggs, valued at 128s. 6d.

Considerable interest is being shown in the second competition, started on 1st April, at Hawkesbury, and in the competition being carried out at Magill under the auspices of the Royal Agricultural Society of South Australia. Added interest is given to the Hawkesbury competition by the presence of three pens sent specially from America.

On the revenue side the value of eggs is price given at Adelaide auction sales. Eggs actually sold fetched from $\frac{3}{4}$d. to 1d. per dozen above these rates. Fowls consumed, young cockerels, have been valued at from—1s. for four months old to 1s. 6d. for six months old birds. Equal quality could not have been purchased at these prices. Stock are valued at 1s. 6d. each. Of t... seventy-nine only about thirty would be parted with at this figure; the balance being Minorca and half-bred Wyandotte pullets four and a-half to six and a-half months old.

The result of the laying competition at Hawkesbury, New South Wales, has caused considerable interest in the laying qualities of various strains, and, to the surprise of most people who keep that breed, the Minorca occupies a very inferior position. Two pens were entered, and the average production per hen for twelve months was 82.41 eggs, as compared with an average of 145.86 eggs from the White Leghorns, Black Orpingtons 142.54 eggs, Silver Wyandotte 142.54 eggs. In my small lot of poultry I have a pen of nine Minorca hens, and the egg record each month since April, 1902, is:—

April ...	21	August ...	134	December	151
May ...	70	September	189	January	162
June ...	84	October ...	200	February	151
July ...	66	November...	200	March ...	102

This gives a total of 1,530 eggs, or an average of 170 per hen during the twelve months. As four of the hens were hatched on 14th October, and two on 28th December, 1901, and were therefore only five and a-half months and three months old respectively at the commencement of the records, the results must be regarded as satisfactory. In the Hawkesbury laying competition only three pens exceeded the average of 170 eggs during the twelve months—viz., Rose-comb White Leghorn, 185½; White Leghorn, 173½; Black Orpington, 171.

The secret, if any, of my success, is good food, regular attention, and cleanliness. First thing in the morning the fowls get a handful or two of grain, and some are let out for a run. About two hours later they receive warm bran and pollard mash; two of pollard to one of bran. Sometimes this is mixed with meat broth from sheep's fry, sometimes with fruit scraps, but mostly plain mash. About once a week a little bonemeal is added, and occasionally a few ounces of Sunlight oil-cake. Another yard of fowls is released at breakfast. At midday a little barley, as a rule, is fed, and, when available, greenstuff is liberally provided. Between 5 and 6 o'clock the fowls all get a good feed of wheat. Douglas mixture is added to the drinking water once a week, and if any fowls show signs of diarrhœa or looseness powdered charcoal is mixed in the morning mash for the particular yard. Shell grit is provided in each yard. The above is not exactly "copybook" treatment, but I find the fowls keep healthy and grow well. The egg record speaks for itself. My greatest difficulty in the past has been to provide sufficient green feed during the summer, as I am not able to command a supply of water to irrigate even a small patch of lucerne or other summer fodder. I find, however, that sea kale, mangolds, and sugar beet will do well during the summer without irrigation if the land is deeply and thoroughly worked in winter and kept cultivated during the warm weather, and am convinced that I can produce on a rod or two of land sufficient greenstuff for 100 head of poultry.—*Journal of Agriculture*, S.A.

PRACTICAL POULTRY-BREEDING.

BY W. HINDES, Poultry Expert, Queensland Agricultural College.

The questions are often asked—Which is the best breed of fowls to keep? Which are the best layers? &c. It is my intention, in writing a series of articles on this important industry, to give my own experience as to the breeds most suitable for our climate, the most profitable varieties to keep, how to breed good layers, the best food to use for the production of eggs, as well as a few hints on table poultry, the best crosses, artificial incubation, caponising, &c., which I hope may prove instructive.

With regard to the best layers, I must first say that it is more a matter of "strain" than of breed; this point I shall deal with more fully later on. Amongst the best breeds for egg-production will be found all the Leghorn family, Minorcas, Andalusians, and Hamburgs; these will generally lay the largest number of eggs in a year. They are non-sitters, very active, suitable for this climate, good foragers, and, with the exception of the Hamburgs, all lay a good-sized egg. With a good laying strain, each hen should lay from 12 to 15 dozen eggs per annum; individual hens will lay more. Unfortunately, all the above are very moderate table birds, it being impossible to get the two extremes in the one bird. We next come to the middle or all-round breeds, which, although they do not lay so many eggs in a year, are slightly better winter layers; this to some extent makes up for the lesser number by the higher price obtained for the eggs during the winter. They are, moreover, very fair table birds. The best all-round breeds are Orpingtons, Wyandottes (white for preference), Houdans, and Langshans. These will give a very good account of themselves as layers, if from a good strain; they are, moreover, very attractive birds, and, with the exception of the Houdans, which are greatly neglected at present (more's the pity!), they are most popular. They are also docile, and well adapted to confinement. All are good table birds, and they will do well in any part of Queensland. We next come to table birds—Dorkings, Indian Game, Old English Game, Houdans, Buff Orpingtons, Plymouth Rocks, and Wyandottes, in the order named. Malay Game make fine large, good quality table birds, but I do not like them, because, on account of their long legs, they are subject to leg weakness—a low-set fowl, moreover, generally matures earlier. Any of the above birds will be satisfactory when on the table, and will give a large quantity of meat, especially the Dorkings, Indian Game, and Malays. The Dorkings have a large, deep, square frame, with a great capacity for putting on flesh; the meat is white and juicy, and they carry a good deal on the breast; they do not, however, do well on wet soil. The Game are especially plump, the meat is solid, fine-grained, and juicy; they dress well, having a small amount of offal. The Malay Game is similar to the Indian. These are the very best for table use, but, as eggs pay best in Queensland, the middle or all-round breeds will give a larger profit than the game, the latter being moderate only as layers. As regards crossing the various breeds, I am not a great believer in crossing for egg-production, for, although I have tried a good many different crosses, I never found them to have any advantage over the best purebred birds. Sometimes I had individual pullets that were very good, but I found that the majority were below the average; although not by any means bad layers, yet by taking a number, say 50, purebred pullets and the same number of crossbreds, the former laid more uniformly all through, and gave the largest number of eggs. The crosses that laid the best with me were the Hamburg-Game, Minorca-Langshan, Minorca-Black Orpington, in the order named. The worst cross I had was a Brown Leghorn cock with a Minorca hen. Although the hen was a really good layer, and the cock was from a good laying strain, the pullets were very poor layers, showing that the cross did not nick well together. Another cross I tried that was a complete failure was Silver Wyandotte and Plymouth Rock for table purposes, the progeny being no larger than a Brown Leghorn. The fact is, that Wyandottes and Plymouth Rocks will not nick either way. For a good all-round breed, table and laying, a really good market fowl, and one that will mature early—for this is the point where the profit comes in, provided they are good layers as well—the Houdan cock and the Buff Orphington hen will just fill the bill. For this cross select good, large-sized, low-set, deep-bodied birds, and be sure to get them from good laying strains. This is the best and most profitable cross that I know of; they are both good table birds, with white juicy flesh, meat of fine quality—especially the Houdan—white skin, and the progeny have white legs. They both mature quickly, but, as crossbred fowls mature more quickly than purebreds, they would naturally be the best for early maturity; both are good layers, the Houdan being a non-sitter. The Houdan-Plymouth Rock cross also makes a very good fowl. It would not be so good for export on account of the yellow legs and skin, but for home consumption I can recommend them. For table purposes only, the Indian Game-Dorking cross is about the best, and makes an ideal table fowl.

Having given some of the most useful and popular breeds to keep, I will now leave it to the reader to decide which will suit him best. First of all, the market and object in view should be taken into consideration, and, if a pure breed is decided upon, select the one you fancy best. Everyone will take more interest in a breed that he likes, and will possibly do better with it than any other. Having selected a breed to suit, purchase—if you do not have them already—some good strong, vigorous birds of sound constitution; and, if you want eggs, get them from someone who has a good laying strain. Select sprightly, active birds, that are always busy; these will generally be the best layers. If for table, select birds of good table qualities. The birds should be unrelated, if possible.

NEW GAMES FOR THE CHILDREN—"LOBBER."

Under the name of "Lobber," Irish boys and girls in the Emerald Isle play the two following games. We cannot affirm that lobber comes under the head of Agriculture, still, as no one in this State seems to have heard of it, we make it a present to our boys and girls on the land as described by two young Irish ladies. One says:—

We name it "Devils and Angels." We play it in this manner:—Two girls are picked out from among us, one is called the devil and the other the angel. The devil has to go and hide in a den while the angel gives us all our names. The devil then comes from his den. The angel stands near us, and says to him, "All the birds in the air, all the fishes in the sea, won't show me the blackbird," or whatever name she desires him to show her. He then comes over, while we are afraid we might fall to his side. If he chances to find the right one, he takes her out, and she is placed on a white string, the devil has the left side of it, and the angel the right. She gives one arm to him, and the other to the angel, while both pull her, and whoever gets her across the string wins her. The game continues the same until all are taken out. The angel and the devil catch each other's hands, the string is left in its place, then both sides pull, and if the angel and her helpers pull the devil and his helpers across the string, win the game. We are greatly excited when we are playing this game for fear we would not get to the angel's side. It reminds me of vice and virtue, fearing that we might happen to fall from virtue and go with vice, which would ruin us for ever. If we keep steadfast in virtue, and work hard against vice, what a great happiness it will be to us, not only in this world, but also in the next.

Another writes:—

"HERE'S THE ROBBERS COMING THROUGH"

is a similar game.

When a number of children are gathered together, two are picked out. They then think of two things—for instance, an apple or an orange, or two colours. If an apple and an orange are chosen, one of them is supposed to be an apple, and the other an orange, but this is kept a secret. Then the rest of the children form a kind of chain, while the other two stand facing each other, and clasping each other's hands, so as to form an archway, under which the other children march and sing a little song. When they have all marched through, they march under the second time, at which the two children who are forming the arch shout:—

Chip, chop,
Chip, chop,
Last man's head off.

When the last child is passing under the arch he or she is supposed to fall down on it, and there he or she is kept a prisoner. The children forming the arch ask the prisoner whether he or she would rather have an apple or an orange, and, whichever is chosen, he or she stands behind whoever is supposed to represent what he or she has chosen, and so the game continues. When all have chosen, the two sides pull against each other. Whichever side pulls the other over a certain drawn line, that side wins.

The Orchard.

EARLY FRUITING PERSIMMONS.

We here illustrate a persimmon-tree of the variety "Yane Nashi." This tree was planted in July, 1900, and formed part of ordinary nursery stock. When the fruit was gathered at the latter end of May, the tree only measured 2 feet 10 inches in height. It had received no water since being planted, yet it bore twenty-one fruits, having a total weight of 10½ lb. The soil on which it is growing is sandy, with a clay subsoil, the aspect the south-eastern side of a hill. Mr. C. A. Flay, the nurseryman at Gympie, who grew this tree, says: "I have been growing a number of varieties of persimmons for some years, and Yane Nashi has proved the best. I consider this lovely fruit should be more extensively grown."

FRUIT-GROWING AT PIALBA.

On the opposite page we give an illustration of a fine smooth-leaved pineapple grown near Maryborough, on the Pialba Railway Line, by Mr. W. J. Montgomery, on his farm, Takura, in the Takura Scrub. The pines on this farm are grown on a western slope at an elevation of about 200 feet, and are planted in rows 4 feet apart with 1 foot between the plants. The soil is of a greyish-brown colour, and is covered by about 8 or 9 inches of calcareous gravel which crumbles away when subjected to great heat, as, for instance, in burning off the scrub. The fruit here depicted weighed 10 lb., and was grown during the drought, practically without experiencing the benefit of any rain. It is by no means the largest specimen of the pines on Takura, as Mr. Montgomery has grown them up to 15 lb. weight. Last May, he sold a large number, all weighing from 9 lb. to 10 lb. each.

THE PACKING OF PINEAPPLES.

Although our pineapple-growers have not yet succeeded in placing their fruit in quantities on the British market, a time will surely come when the difficulties attending their transport to the home markets will be overcome. The question of properly packing pineapples for export has repeatedly been discussed and explained by Mr. A. H. Benson. At the same time it can do no harm to let our readers know what is being done in that way in Jamaica. The following remarks on the subject are taken by the *Agricultural News* of Barbados from a pamphlet entitled "Jamaica Fruit in British Markets," by Mr. W. B. Gill, published by the Jamaica Agricultural Society:—

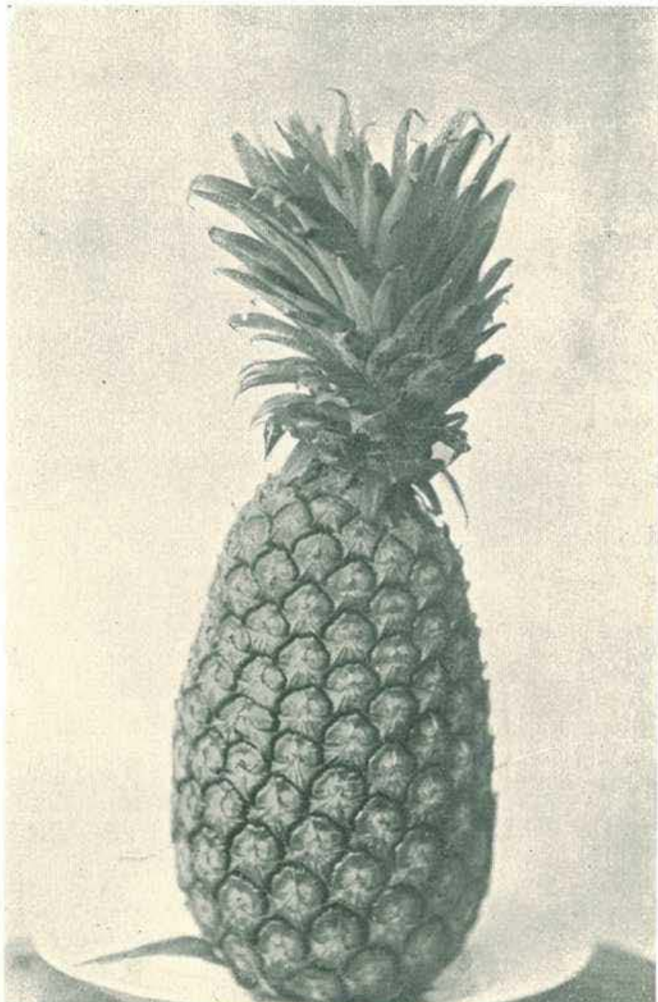
The same remarks apply to condition and appearance of this fruit as have been observed in regard to oranges. Pineapples should never be packed more than ten or, say, twelve in one package, and this should be a flat case. The crowns should be left perfectly free and placed so as not to be at all crushed or injured in any way. The handsomer looking crown, the better the price will the pine fetch. Again the maxim comes in, to never mind the increased freight space for the sake of doing away with what is considered by the shipper as worthless. A choice pine is bought as much for decorative purposes on the dinner table as it is for the eating.

Very choice fancy pines should never be placed more than six in a case, say three at each end.

Plate II.

EARLY FRUITING PERSIMMON TREE.

Plate III.



A Smooth-skin Pineapple from "Takura."

I saw some St. Michael's pines (from which place all the best and finest pines come to England) selling in Liverpool and by wholesale dealers at 2s. 6d. and some at 5s. each, and selling quite freely at that. This was largely due to their bright, clear, fresh appearance.

I have seen in Jamaica plenty of pines quite as large and some larger than these same St. Michael's and of tasting qualities unsurpassed, which I have frequently bought in Kingston for 3d. or 4½d.

I had a small shipment of 180 Jamaica pines put up for sale while in Liverpool, and the highest price fetched was 10d. I feel thoroughly satisfied had they been packed as St. Michael's are packed, and opened out as fresh and clean (for there were some in shipment quite as large as the above pines I have just quoted as selling at 2s. 6d. and 3s. 6d. each), I could have obtained these prices without much difficulty. As it was, the 180 were packed in ten orange boxes, and were not only in consequence crushed, but showed 15 per cent. of "speckled" or started pines, which, of course, fetch litle or nothing.

Very ordinary-looking pines retail in most of the cities and towns throughout the kingdom at 1s. to 1s. 6d. They are sound but small; while "specked" fruit can often be had equally large for 6d.

PRESERVATIVES IN FRUIT SHIPPING.

A number of experiments have been made by T. J. Ashby, secretary and manager of the Pasadena Lemon Growers' Association, who sends the following particulars to *California Fruit Grower*. As these experiments were in the line of preserving oranges and lemons while in transit to market, and as much success has attended the efforts of Mr. Ashby, the account of the trials made will doubtless prove of interest to growers and shippers. It might be stated here that a certain newspaper attempted to publish the results of the series of experiments, but it failed miserably in points of accuracy. The gentleman says:—

"Formaldehyde is the principal ingredient used by Manager Ashby. Twenty-five cents worth of the chemical will fumigate an entire carload. There are 20,000 carloads of citrus fruit sent annually from Southern California, and if each car was properly fumigated the results would more than repay the trouble that would be required. There is, under the present system of shipping, a decay of from 5 to 15 per cent. of the fruit in shipment, and this can be saved, I am satisfied, by the use of formaldehyde. By the experiments we have already made, we can see a difference in the preservation of citrus fruits. If the men at the other end would co-operate with us, I think the amount of decayed fruit in shipments would be greatly diminished.

The process is simple and effective. When a car is packed with fruit ready for shipment, Manager Ashby pours 6 oz. of formalin into a pint of water, and places the vessel containing the fluid upon a small oil stove so that the water will simmer. The car is then closed and the disinfectant is left to do its work of destroying any spores or germs that may be clinging to the fruit. According to Mr. Ashby, the pollen from flowers and fungus do not separate themselves from the parent growth under less than 56 degrees of heat, so that an iced car insures the arrival of the fruit in good condition.

As soon as the fruit is exposed again to warmer conditions, and after having condensed moisture in its cold state, the spores that have been lying dormant during the trip may germinate, and one mouldy orange or lemon will fill the car with germs that will soon infect the entire carload. This formaldehyde gas exuded in the fumes from the simmering formalin impregnates the tissue wrappings of the fruit, and also has an especial affinity for wood fibres, and thus the fruit in the car is made practically immune."

Horticulture.

TOMATO WILT.

Lately we have noticed some of our best tomato plants wilting, but could not arrive at the cause of the trouble until we came across the note on the subject by Mr. A. Despeissis in the *Journal of the Department of Agriculture of Western Australia*. That gentleman says:—

This disease has been unusually prominent on tomatoes this season. The trouble is a bacterial blight. G. Delacroix, a French scientist, who has it under observation, first attributed it to an organism described as *Bacillus solanacearum;* subsequent studies have since led him to state that the disease in question is not to be attributed to this organism, but to another apparently undescribed, to which the name of *B. solannicola* is given.

The attacked plants wilt suddenly, and after a time leaves and stalks become discoloured and die. If a section is made of the stem, the pith channel is found brown, and small warty spots on the stem, not unlike the water core of apples, let droplets of dirty white liquid exude. This liquid is full of bacteria. In potatoes this discolouration extends down the stalk to the tubers, which turn brown and rot. The disease is mostly spread by inoculation caused by the bite of insects; it is also associated with a web-like ground plant fungus, *Rhizoctonia solani,* which extends its meshes from plant to plant, boring directly into the healthy cortical cell, and thus giving an entrance to the bacteriæ.

The first step to take is to spray with a poisonous mixture, and destroy those insects which feed from plant to plant, thus spreading the disease. One ounce of Paris green in 10 gallons of Bordeaux mixture will effect this. Carefully dig round the diseased plants and prevent the spread of web-like fungus to healthy plants. Root up and carefully burn diseased plants.

The organism causing this trouble is believed to be present in the soil, from which it spreads to the plants, and unfavourable meteorological conditions are a contributing cause of the infection. Sour ground aggravates the disease.

Tomatoes, potatoes, egg-fruit, black nightshade, Cape gooseberry, among other plants, harbour the germs of the disease, and for that reason should be avoided in the course of rotation over infested ground.

CHINESE SACRED LILY.

One of the very best species of Narcissus is a sub-variety of *N. Tazetta,* known in horticulture as *N. Tazetta, var. orientalis.* It is usually grown in the same way as a hyacinth—in a bottle of water. But the *Florida Agriculturist* tells us that in Florida it is perfectly at home in the open ground. The editor of that journal says:—

We planted a single bulb in a bed north of the house thirteen or fourteen years ago. It has never been disturbed, and has had no special care, merely a little fertiliser at long intervals and grass kept away part of the time.

The one bulb has increased to twelve. Seven of these have bloomed this spring, each stem bearing from six to thirteen beautiful white flowers. Looked at from one side, the clusters of blossoms seem to be pure white. But it is not, for the tiny crown in the centre of each bloom is light lemon colour. With better care it would doubtless be more prolific of flowers. Yet all the family are well suited for the gardens of those who have little time or strength to devote to their flower beds, for they will stand neglect better than anything we know of except crinums and roses.

GARDENING.

When we look round the suburbs of Brisbane and compare the tasteful adornment of some of the country residences of city workers with others adjoining them, where no attempt has been made to beautify even the piece of land in front of the house, we cannot fail to be surprised at the neglect of so charming a relaxation after a day's work in the hot city offices and shops as gardening affords. The labour of planting and keeping up a small flower or vegetable garden is so trifling, that it becomes not only a source of amusement, but of health, not to speak of the air of refinement that such surroundings give to the humblest dwelling. We must say that the Germans are far ahead of us in this respect. Wherever one travels into the farming districts or suburbs of a town, and sees a pretty garden, always with a few vines on stakes or trellises, it is almost safe to say, "That house belongs to a German." In a paper lately read by Mr. G. Wiscombe before the Central Queensland Horticultural Society on the subject of gardening, he strongly impresses upon owners of houses and vacant allotments to cultivate them both for pleasure and profit. Omitting the introduction to the paper, Mr. Wiscombe says:—

Horticulture is a most delightful hobby, and may, by its absorbing interest, become something more than a pastime. It becomes a material factor in beautifying the surroundings of our homes. Some years ago, when I first came to Rockhampton, I was agreeably surprised to find in evidence the love of flowers amongst the residents being so general. Wherever I went I could see the majority of householders striving to make their homes more attractive by their aid. The suggestions I now offer my experience convinces me will, if carried into effect, enable that work to be carried on easily, satisfactorily, and perhaps remuneratively as well. With ordinary common-sense any kind of soil can be converted into a good garden for the growing of flowers and vegetables, but in order that a little of everything may be grown, including roses, fruit, and shrubs, I will first deal with trenching and preparing the ground. This should be done by digging 2½ feet deep, the subsoil to be well moved over. I do not approve of the method of bringing the subsoil to the surface. Should the land be low, without natural drainge, or subject to soakage, it must be drained with 3-inch porous pipes. In some parts of the town, where there is no fall and drainage cannot be resorted to, the only alternative is to break up the land as stated, and then fill up with good garden soil to a depth that will suit the surroundings and allow the plants to grow without the roots coming in contact with any stagnant water beneath. I may here state that many gardens are permanently ruined in Rockhampton, not only from a gardener's standpoint, but also in value, by garden soil being used to fill up with containing tubers of the dreaded nut-grass. A good dressing of manure, consisting of old rotten cow and horse dung, sheep droppings, or bonedust, should be well dug into the soil, after which the ground should be levelled. It will then be ready to lay out into beds. The front garden, unless it be a large one, should be laid out as simply as possible. To attempt anything elaborate on a small piece of land tends to dwarf it and make it appear much smaller than it really is. It is a common practice in town to attempt to crowd too much into a limited space. Some, owning say 66 feet frontage or less, have a dozen or more beds of all sorts, shapes, and sizes, some only a yard or so in diameter, bordered with heavy thick slabs of hardwood. This, in my opinion, is absurd. Nothing sets off a garden so well, or is more effective, than a grass plot laid down with the best of all grasses for this climate —*Cynodon dactylon*, or couch grass, which must be kept well cut. A gravel path should lead from the front gate straight to the house, and should be of sufficient width to correspond with the size of the house and garden. This path would look well bordered with tiles, or ¾-inch hardwood boards, 8 inches wide, 4 inches in the ground and 4 inches out, supported by 3-inch by 2-inch hardwood stakes, driven into the ground immediately under and in line with the border. An inch slot is cut out of the stake 4 inches deep. The board fits into that. The stake is driven level with the ground, is out of sight, and keeps the border in exact position. A flower border around the house, or in front, as space permits, is very effective, and one bed of any design in the centre of each grass plot is sufficient. Small round beds can be cut out to accommodate trees or shrubs, if desired, in any part of the plot; but it is a mistake to attempt to cram too much into a small patch. Neatness and simplicity amongst flowers is my motto. A *Duranta* hedge, well kept, looks pretty around the garden; but, unless plenty of space can be allowed, it is far better dispensed with. For a large garden the foregoing remarks will also apply; but, of course, more beds could be formed of different designs to suit the size and general surroundings. Flowering shrubs and trees can be planted. Wide walks look well bordered with bricks laid on an angle. Alternanthera is very effective also, but requires considerable labour to keep in order, besides being a harbour for slugs. All flower beds should be slightly raised in the centre, and, presuming the beds are ready for planting, I will now deal with the question of what to plant. The rose, of course, takes precedence. Those who have sufficient space should allow roses a bed by themselves. Few, however, can afford the room, and consequently require something else to fill up with which will make the garden bright and attractive. Next to the rose in order of merit comes the carnation. I do not refer to the perpetual varieties, the climate being unsuitable for the development of these successfully. Neither are the ordinary common marguerite varieties worth growing. I refer especially to the new race of early-flowering perpetual varieties—namely, Vanguard, Prizetaker, Riviera, and others. This race of carnations is fast superseding the old perpetual, especially in warm climates, and will compare with them at any ordinary show. For keen competition in the south it is necessary to propagate, disbud, shade, &c. Show carnations there are worth all the care bestowed on them. For our climate and gardens we have the next best carnations in the varieties I have mentioned. They will bloom within six months from seed, and it has been proved that seed saved with skill from the finest double varieties will produce plants yielding hundreds of flowers which no grower need be ashamed of. The colours are too numerous to mention; but the deep red, yellow, and pure white are very fine. I have grown them since they were introduced, and cannot too highly recommend them either for garden or pot culture. The town water does not affect the blooms or plants. Seed can only be obtained from really first-class seedsmen in England, and should be sown in the beginning of February. The plants will then be ready to go out early in April. The next in order is *Nemesia strumosa*, the most beautiful annual of recent introduction. It is a native of South Africa, and is a dwarf in habit. Its colours are yellow, orange, rose-pink, crimson, &c. It does splendidly in any of our soils, and blooms continually until killed by our summer heat. Seed must be carefully raised in boxes protected from heavy rain and sun. Hunnemannia is known now to most people. I will only say that it is one of the most useful we have for table decoration. The colour is yellow, resembling a poppy, and is very easily grown. The seed is better sown in the garden where the plants are to remain. The Pentstemen is my next favourite. It is a handsome herbaceous perennial, producing long spikes of gloxinia-shaped bloom of almost all colours. Seed sown in February will produce plants in flower in July. The next is Leptosyne, a most lovely lemon-yellow flower resembling marguerites, carried on long stems, which are very useful for cutting. It will bloom six weeks after sowing. Sweet Sultan, a remarkable plant, is the next deserving of attention and consideration. It grows well here. When sown as others it will bloom continuously until Christmas. The colours are pure white, blue, purple, and yellow. It has the advantage of being very hardy. I have enumerated the foregoing six varieties, as I am convinced that anyone growing them will not regret it. They are subject to no ailment, and will give a bright and gay appearance to the garden for nine months of the year. The carnations can be left, and will bloom for two or three years, or cuttings and layers can be taken in the usual way. There are numerous other annuals deserving a place, and are well known to all—such as stocks, phacelia, calendula, French honeysuckle, aubrelia, phlox, and many more, the habits of which are so well known that it would be useless for me to say anything about them here. Geraniums of sorts should not be forgotten, especially the bright scarlet single foxhunter. Ninety per cent. of the homes here would be vastly improved if the owners would devote a little attention to their back gardens, which should be kept as neat and attractive as the front. A small patch should be set aside for the growing of vegetables. A rustic summer-house looks well covered with climbers such as, for instance, maurandyas, solanum seaforthianum, phaseolus, ipomea, bignonia, or alamanda. A bushhouse for ferns, &c., should also have a place, but as that is rather a big subject I do not propose dealing with it now, but will leave it for someone else to expound. I certainly think more shade trees should be planted around our homes, and to do so in an inexpensive way I would suggest that holes be dug 1 foot deep and 5 feet or 6 feet in diameter throughout the loose soil. Then make a hole with a crowbar about 2 feet deep in the centre of that already dug, attach a piece of fuse to a full plug of dynamite, drop it gently down the hole; then fill up with loose soil, and "let her go." That will trench your hole better than you could do it in half-a-day's sweating with pick and shovel. Should the subsoil be very hard, use two plugs of dynamite. Refill the hole again with the best soil you have, mixing a little bonedust with it, and plant your tree. Should you have any trees growing which appear stunted owing to the roots being unable to penetrate the hard dry subsoil, have recourse to dynamite as already described. Make your hole 2 feet or 3 feet deep, according to the size of the tree, and about 1 foot from the main stem. Water freely if it is dry, and you will be astonished to see your tree improving its growth. If the tree is a large one, use two or three plugs of dynamite round it. I have treated hundreds of trees laden with bloom and fruit, but stunted through drought or stagnant water at the roots, with highly satisfactory results. I recommend this treatment only when the subsoil consists of clay or any soft substance. It must not be used on rock. Care must also be exercised in using the dynamite or the operator may not live to enjoy the fruit of the tree upon which he is operating. Hollow logs about 2 feet long, which any woodcarter will supply, make pretty rustic receptacles for plants or small trees, and, placed in suitable positions around the back yard, will take off the bareness and present a pretty appearance from the back door or windows. Aloes, junipers, yucca, hibiscus, neriums, polyantha roses, and a host of others can be with advantage planted in these logs. Fowl-houses and outbuildings can quickly be covered, by erecting light trellis-work, with tecoma, antigonon, humulus, or banksia roses. Looking at those homes situated away from the flat part of Rockhampton, either north or south, where the soil and subsoil are good, and where the owners have plenty of room, it seems a thousand pities that so much splendid soil should lie waste or be used only for the cultivation of weeds. For fourteen years continuously in Queensland I have grown and exported all sorts of tropical fruits, and, having made a special study of that kind of work, claim to be able to speak authentically. I can safely say that for growing pineapples especially, plums (American varieties), peaches, loquats, persimmons, comquats, Indian limes, citrus, and all kinds of extremely profitable ground fruits, I have not seen any better land in the State than the vacant grounds belonging to those homes above the Dawson road and extending right through the Botanic Gardens to the lagoon. The owners are evidently unaware of the growing capabilities and revenue-producing value of their land, otherwise it surely would not be allowed to remain unproductive. I do not consider it within my province in this paper to say more on the subject, but only to suggest that some landowner who has no particular use for his land should plant some of the fruits I have mentioned, and if planted and attended to properly I am certain the result would be not only satisfactory, but far and away beyond his most sanguine expectations.

Tropical Industries.

RAMIE (CHINA GRASS).

We have repeatedly drawn attention to the great value of ramie fibre in the various European markets. In 1898, a Mr. Kershaw, a Manchester manufacturer, informed us that there is absolutely no limit to the market for ramie fibre. It is in every way superior to jute; and whilst the finer silk-like fabrics of jute can be distinguished from pure silk, it is almost impossible to do so in the case of ramie fabrics. We asked Mr. Kershaw if the price quoted to us—viz., £30 per ton—was correct. This, he said, was an absurd price; it meant only 3¼d. per lb., whilst the ordinary market price of ramie fibre is 6d. per lb., or £56 per ton. The improved cleaning machinery would tend to increase the price. Ramie is a fibre which lends itself to the most delicate fabrics as well as to the coarser ones. Silk dresses, silk ties, and a variety of so-called silk goods never came from the silkworm, but from the ramie or China grass plant. Mr. Kershaw added that, from his knowledge of the trade and from what he had learnt whilst in the colonies on the subject of the adaptability of the soil and climate of Queensland to the cultivation of the plant, he came to the conclusion that it was eminently worthy of attention.

In the same year a sample of decorticated ramie fibre grown at the Wollongbar Experiment Farm on the Richmond River was on view at the office of the Minister for Mines, in Sydney. A bundle of "ribbons," as the stalks of the plant are called in their undecorticated condition, but with a certain amount of preparation to permit of their working, was sent to England to the Agent-General for that State. The samples manufactured were returned, with reports of experts on the samples of rough ribbons. They were treated by the Rhea Fibre Treatment Company, Limited, of London, by the Gomess process.

We quote from one of the Rhea Company's letters:—"My foreman . . . . considers the ribbon excellent, and far superior to the rubbish that has hitherto been on the market. The ribbons will work well, as the fibre is good and strips well generally. Can you make me an offer to supply? We would make good terms for our patrons."

Another letter says:—"We can use any quantity of it (*i.e.*, ribbons), value about £14 per ton; but it will not keep at this figure; our decorticator would cheapen it and improve the condition. I would recommend you to indent patents and filasse in the colony, and send home the filasse, which would be better."

A third letter runs as follows:—"I have pleasure in sending you the result of your rhea ribbon. It is very good and very promising. If you would like to send me some more to this address, I will get it filassed and gummed. Although the fibre is yet young, it will work well, I think. I hope you will not let the ramie question drop; evidently there is a big future for it in your colony."

Since the ramie plant thrives so well in this State, it seems strange that no one has yet taken up its cultivation on a commercial scale. The ribbons are sure of a good market in the old country, so that there would be no absolute necessity for the employment of machinery for filassing it.

There are two kinds of ramie. One is the *Boehmeria nivea*, China grass; the other, *B. tenacissima*, commonly known as Rhea grass.

The first is a shrub, which grows to a height of 8 feet in suitable localities. It belongs to the order of nettles (*Urticaceæ*). The leaves are ovate and notched round the edge, on fairly long leaf-stalks, green above, but white beneath. The flowers are very small, and borne on long hanging racemes from the axils of the leaves. They resemble those of the English nettle, and are greenish-white. The stems of the plants are woody, about as thick as a pencil, and when full-grown are reddish-brown in colour.

The *B. tenacissima* is distinguished by its leaves being greener, sometimes quite green on the backs; and though there are forms of it in which the backs are whitish, they have not the conspicuous white colour of the real China grass. On many accounts, it is better to grow Ramie or China grass than rhea.

Cultivation.—The plant is grown, as a rule, from cuttings, although plants can easily be raised from seed. This is a slow method, and, as the stems should be cut before the plant flowers, ripe seed cannot always be obtained. Almost any bit of the stem will grow, but rooted cuttings from the base of the plant are best. The stems push out stolons underground in all directions, and the tuberous portions of these speedily send up branches when planted.

Soil and Climate.—Ramie will thrive in almost any soil except a stiff clay or a very wet soil. Flooding quickly kills it. It likes partial shade, but grows well exposed to the full heat of the sun. It cannot stand against a long drought. The best climate for it is one without any sudden and violent changes, because a constant change from very hot and dry to heavy rain spoils the fibre, which, under such conditions, grows irregularly.

Manure.—On soils requiring manure, wood ashes and cowdung have been found to be the best fertilisers for ramie.

Growth.—When rooted cuttings have been planted the growth is very rapid, but, although the stems will shoot up to a height of 8 feet, it is better to cut them when only 4 feet high. When ready to cut, the bark becomes brown, and the stems should be quite firm.

Enemies.—Ramie has very few animal or fungoid enemies, almost the only one being a small moth-caterpillar, about 1 inch long, of a dirty green colour, with a black head, and sprinkled with some scanty hairs. This insect rolls up the leaf and eats it. It does not, however, appear to injure the plant unless in very large numbers. It forms a chrysalis in the rolled-up leaf, and in a few days emerges in the form of a small grey moth.

Extraction and Treatment of the Fibre.—There are several machines and processes for the extraction of the fibre, the most popular machine being that of Mr. Faure, although one has been introduced into Australia by Mr. Max Rowl, which claims to be efficient.

The following circular letter just received from Mr. D. Edwards-Radclyffe, of West Hampstead, London, who, we presume, is deeply interested in the extension of the industry, will throw more light upon the value of the fibre as an adjunct to farmers' crops in this State:—

"Could you not draw the attention of your readers to the possibilities of 'Ramie' or 'Rhea'? Our empire is vast, and there are millions of acres awaiting cultivation, but in these days of competition the difficulty is to find a paying crop. Now 'Ramie,' or 'Rhea,' 'Urtica,' or 'Boehmeria,' grows in almost any zone—of course, with different results, as it produces from one to four crops per annum, according to locality. It would be a paying crop on waste land, useful for no other purpose. The cultivation is easy, and when once planted it will thrive for about eighteen years, requiring but little attention beyond hoeing, mulching, &c.

"The demand for this fibre (which is the strongest and longest of all fibres) is increasing by leaps and bounds. Hitherto the Chinese alone have been alive to its merits, and they have cultivated it largely for home consumption, but little finds its way out of the country, and then only at prohibitive prices. At present it fetches as much as £35, and even £40 has been paid this spring. When once a plantation is firmly established it could be cropped for £3 10s. per ton, I am informed, in a country where three to four crops can be obtained yearly. Think of the vast possibilities of profit this opens up! The one great drawback hitherto has been the irregular supplies. For sail-cloths, fishing lines, nets, ropes, &c., it is invaluable. Its uses are legion, but as the supply is depending on one country it is comparatively unknown. If our planters would put their hands to the plough, and cultivate ramie, a vast industry, as great as cotton, would spring into existence. The first planters will make fortunes, and large profits will prevail for years, as it will take several decades to cope with the demand, and even then a steady trade is to be relied on. America is quite alive to the possibilities, and the U.S.A. Chamber of Agriculture is encouraging its growth. Why do our colonial Governments not foster it? India, Assam, Straits Settlements, Australia, Tasmania, New Zealand, Borneo, West Indies, Guiana, Natal, South, East, and West Africa, could all grow ramie profitably. Another great advantage, it can be so easily manipulated, that all these and other colonies could establish industries to work up the splendid fibre on the spot, so not only would the farmer benefit, but he could find a market at home, and not depend alone on English markets. There is no reason why manufacturers could not and should not start in almost every colony of the empire.

"With this vista of a profitable industry in view, our colonial Governments, Chambers of Agriculture and Commerce, planters, farmers, and manufacturers would do well to inquire further into the possibilities of ramie, rhea, or China grass.

"Anyone desirous of knowing more as to cultivation, seed, and manufacture have but to send me a few stamps of the colony as compensation for postage, and I will send them particulars and information how to procure seed and machinery, &c., as I am desirous of encouraging the trade, in what I designate the textile of the future, in every possible way.

"The demand at the moment for dress goods (Bradford), incandescent gas mantels, saddlery, boot threads, and similar goods is enormous, and far beyond the limited supplies. The 'Shamrock,' 'Bona,' 'Dragon,' and many of the leading yachts have sails of ramie.

"I trust you will draw the attention of your readers to the above, and that it may be the means of starting a profitable industry in many of our colonies."

Ever since 1897 we have persistently kept our readers posted up in everything that concerns the cultivation, manufacture, and marketing of ramie fibre, but so far no attempt has been made to start the industry. It is the same with other fibres, such as sisal hemp, plantain fibre, jute, flax, &c. The Australian farmer does not take kindly to such crops at present, whatever he may do in the future, when production of ordinary farm crops increases to the extent of having to enter into competition with other agricultural countries in the export trade.

In 1898 we published an abridgment of an article in the *Tropical Agriculturist* (Colombo) giving somewhat conflicting estimates of working expenses and profits of a ramie plantation. We reproduce the estimates for the benefit of possible future planters:—

RAMIE CULTIVATION.

Mr. L. Wray, junr., prepared for the Perak Government all available information respecting the yield per acre, the cost of harvesting and preparing, and finally the value of the result. He finds the mean yield of fibre per acre to be 1,173 lb., and of ribbon 1,656 lb. Then, as to cost. Very little is to be found in any of the accounts of ramie of the cost of the cultivation. It is variously stated that one coolie can keep in order 2 to 3 acres of land, but there is nothing on which to base an estimate of the cost of harvesting and preparing the crop.

Taking two coolies to 5 acres and the wages at $9 per month, the cost per annum is $43.20 per acre, and per ton of ungathered ribbon $58.45. Considering that 15 tons of stalks have to be treated by acre, Mr. Wray does not think that less than $20 could be allowed per ton of ribbon. This would bring up the cost of the ribbon to $78.45 per ton or $57.98 per acre.

There are then supervision, manure, rent, duty, and buildings. The least that can be allowed for this is $10 per acre per year. Taking a 500-acre estate, this would be made up as follows:—

Rent at 50 cents per acre	$250
Supervision, $300 per month	3,600
Manure	500
Upkeep of buildings	250
Duty on 369.5 tons, at $2\frac{1}{2}$ per cent. ...	623
	$5,223

The final cost of the ribbon would be $91.97 per ton or $67.98 per acre.

Summing up as to result, Mr. Wray is not encouraging:—

Dr. D. Morris, the then assistant director of the Royal Garden, Kew, in a lecture delivered on the 30th November, 1896, gave the price of ribbon as £8 per ton in London. It does not appear that more than £7 ($67.20) per ton could be reckoned on; and as, by the above estimate, it would cost to grow and prepare $91.97 per ton, it would appear that there is a loss of $4.77 per ton, or $18.30 for each acre of cultivation.

A reply to Mr. Wray's report came from Mr. E. Mathieu, of Singapore, who quotes actual experiments made for two years at Buitenzorg, Java, under the control of the director of Botanic Gardens:—

> One bhow ($1\frac{3}{4}$ acres) gives four cuttings in one year, weighing in the aggregate 34,000 kilos (74,800 lb.) of green stems without leaves and topped.
>
> One acre gives 42,800 lb. stripped and topped.

Mr. Mathieu then quotes a series of American experiments, the result of which is shortly:—

Countries.	Number of Years' Growth.	Number of Cuttings per Year.	Weight of Stems without Leaves and Topped per Cutting per Acre.	Weight of Stems without Leaves and Topped per Acre and per Year.
			Lb.	Lb.
Java	2	4	10,700	42,800
Louisiana...	3 to 4	2 }	12,880	25,760
Texas	,,	2 }		
California—Kern Valley ...	,,	4	12,600	50,400
Algeria	4	3	11,013	33,040

Mr. Mathieu is inclined to think that after three or four years a ramie plantation in Malaya should give in four cuttings 20 tons of stems per acre per annum. Such an estimate we (*Tropical Agriculturist*) consider most unreliable to work on as a permanency, even on the richest soil and with the best possible cultivation. Mr. Mathieu next proceeds to lay down the cost of producing 1,680 lb. of clean dry fibre per acre, worth £24 in London.

This he totals up to $137.70 as a maximum, leaving a net profit per acre of $102.30 (about £10 5s.); but he also shows how, by the planter partially degumming the fibre himself, an additional profit of $34.20 per acre can be made, thus bringing his total net profit per acre to $136.50, or £13 13s. (English).

Finally, amongst the papers is an estimate from Mr. J. MacDonald (of MacDonald, Boyle, and Co., London) of the machinery necessary to decorticate and degum the produce of 1,200 acres of land, and of the profits to be made after putting the ramie through all the processes necessary to render it fit for the manufacturer, in which condition it will readily command £42 per ton in Great Britain. In France, as much as 2 francs per kilo (equal to about £90 per ton) have been offered, &c., &c.

We may as well put Mr. MacDonald's sanguine figures on record, though we fancy few practical planters will put faith in those referring to return on working of estate:—

Estimate of Cost—900 Acres under Cultivation.

Machinery		£6,775 0 0
Cultivation: first twelve months' expense after planting*		£3,208 5 0
Cost of six months' treating the fibre, say 156 working days		3,269 12 0
		£6,477 17 0

Return from Estate, first year.

At the end of the first year the product may be estimated at at least 450 tons of cleaned fibre, ready for the manufacturer. Taking the sale price of this at only 4½d. per lb., it amounts to ...		£18,900 0 0
Cost of producing the above as on the other side		6,477 17 0
		£12,422 3 0
Freight at £2 per ton ...	£900 0 0	
Brokerage and incidentals, 2 per cent.	260 0 0	
		1,160 0 0
Working profit		£11,262 3 0
For the second year the yield is estimated at 1,350 tons, value		£56,700 0 0
Cost of production		13,552 7 0
Working profit		£43,147 13 0

From these working profits, 25 per cent. patentee's royalty will have to be deducted.

For the present we would only note one little point of discrepancy. Mr. Mathieu, writing on actual experience, bases his estimate for Malaya on a three and a-half to four years' old ramie plantation. Mr. MacDonald begins operations six months after planting! It is a pity that planting opinion should, we feel, be prejudiced at the very outset by estimates and figures which seem to us far too glowing. Far better pleased would practical men be to see a well-considered moderate statement work out a possible profit at £5 per acre, than to be met with £12 profit per acre the first year, and well-nigh £50 in the second year, from a cultivation which, so far as we know, no one has yet tried on a scale sufficiently large to justify reliable estimates for a plantation at any rate in the Eastern world. Garden estimates are useful as guides, but they do not count for serious estimates on a big scale with experienced tropical planters.

Since the above was written, we have seen it stated that Mr. MacDonald has arranged with a native Sultan (Datu Mahommed) to put 1,000 acres under ramie, and that a central factory is to be erected to treat the product after the MacDonald-Boyle process. This undertaking and experiment will certainly be watched with the greatest possible interest. Mr. MacDonald has a wide margin to work on, and we wish him all success.

* The cost of land, of plants, clearing and breaking up ground, enclosing, and planting are wanting in this estimate.—Ed. *Q.A.J.*

RAMIE IN THE STRAITS SETTLEMENTS.

From some correspondence addressed to the Superintendent of Gardens and Forests of the Straits Settlements, and published in the Agricultural Bulletin of the Straits, we find that there is a kind of ramie called "Black Ramie," which is the fastest growing and tallest variety in those States. It yields less fibre than any other kind, the waste is greater, and the cost of preparing is more. Mr. J. Anderson, the writer of one of the letters, says that Black Ramie is the worst variety grown. Some of the ribbons of this species shipped to England were destroyed at Liverpool, being so valueless that no one would take them at a gift. He goes on to say:—

Why Mr. ——— or anyone else should persist in growing this stuff is a mystery to me, as I am of opinion it is as easy to grow the best as the worst—that is to say, if the best can be got. Nothing that I have seen can equal the beauty and quality of the China grass ribbon, and I somehow think that no European grower has ever got the genuine roots of this finest of the ramies. Good as some of it is that I have handled, it cannot compare with this for quality and length of fibre. The waste on it, too, is only about a half, as compared with good fine ramie, and only about a quarter of what this sample of yours will lose. In removing the black skin on this of yours, I lose fully 22 oz. After this I have the gum to get rid of, so that the sample will lose not less than 50 per cent. By this you will see how expensive and wasteful it would be to grow this if better can be had. At the same time, it could be freely used if put on the market at a low figure, as it could be used easily with the bark removed similar to the enclosed sample. It says much for Mr. ———'s perseverance that with such meagre results he has not lost faith and hope of ultimate success. To get 2½ per cent. of ribbons only—equal to 56 lb. from 1 ton of stems—would have disgusted most men. Such a result as this in its pottering insignificance proves the uselessness of any machine for such a purpose, and if better results than this could not be obtained the growing of ramie would be better left alone. I enclose sections of stems that were grown in the Glasgow Botanic Gardens, and which came off quite clean, and the ribbon did not shrivel in the way that most of it does that is taken off when green. In taking it off I get every particle of fibre that one can get when the stem is green, as there is always an inner peel that adheres to the woody portion of the stem. As you want to know the selling value of the fibre, I enclose a sample of some for which £37 10s. a ton is asked. I also enclose a strip of the cream of this fine fibre, which I recognise as China grass which no effort ought to be spared to produce. Most that has come here is that black stuff, which has simply damned the fibre and disgusted all who have taken it in hand. As to getting an outlet and market for the fibre, if it could be had in quantity and delivered ready for use in the manufacturing linen centres of Scotland, no difficulty would be experienced. As I have already maintained from what I know of other fibres, this is one of the most easily dealt with, if the best is produced, and will give the most generous results if reckoned in the dry state with the tons of sap left out of the count as it ought to be along with the enormous leafage, all of which ought to be got rid of before being handled and the ribbons taken off. The broader this is removed the better. To make ramie pay it will have to be handled by the ton, and turned out in hundredweights, and not in pounds, as at present by the use of patent-pottering machines. All this I can do at a comparatively low cost.

In a second letter to the Superintendent of Gardens and Forests, Mr. Anderson says:—

I herewith return part of the ribbons you kindly sent me. In the condition you see it, the wastage is about 50 per cent. For comparison, I send along with this the best class of ramie, the waste on which is 25 per cent. The trouble and expense in cleaning is not more than a half as compared with this of yours, and the results are much superior, as it takes on a far better finish, especially as the fibre is mature, which yours was not. This accounts for the woolly look that yours has got. Independent of this, if nothing better could be had, this of yours would pay to grow. From your experimental plot you ought to have no difficulty in showing growers what they might expect from an acre of suitable ground. You can at the same time compare this with flax grown in Ireland, and which has to be annually sown, and which does not yield more than an average of 3 cwt. of cleaned flax to an acre, worth on an average not more than 50s. per cwt. for the past ten years, according to printed returns. Although I do not regard your ribbons as being the right sort, I recognise the splendid possibilities of the country you are in for the development of this grand fibre, and, considering the time your roots have been in the ground, the result is amazing, and confirms the impression of all I have seen and read, that there is nothing grown under the sun finer than ramie, and no plant grown for fibre that could yield more generous results except jute. In the condition of these samples any quantity could be sold and used at prices that neither flax nor cotton could obtain. I have shown these to men largely interested in manufacturing, and they all admit and predict a great future for this finest of vegetable fibres.

SEA-ISLAND COTTON IN FLORIDA.

The *résumé* of the situation in the cotton-growing countries of Alachua and Levy, given in *Times Union and Citizen*, shows, with sufficient clearness, that the Sea-Island crop—the old familiar stand-by of our native farmers—is in some sections of the State, at least, fast resuming its former place in the estimation of those who really live by the plough as the safest and surest of money crops for this latitude.

That *résumé* shows that upon the 35,000 acres planted in long-staple cotton in those counties last year, no less than 8,400 bales were produced, and that this crop was worth something over $500,000, an average of about $17 an acre.

In view of these gratifying results, it is not at all surprising to learn that the coming season will probably see an increase of 10 per cent. in the acreage devoted to the cultivation of this staple crop throughout the entire Sea-Island cotton belt of the State. So far as the crop itself is concerned, little can be said against it. It has one great advantage over many of the crops with which experimental enthusiasts have from time to time sought to replace it—both soil and climate seem to suit it, and, with suitable cultivation and favourable seasons, absolute failure is out of the question.

The great danger in cotton is the old temptation to overplant and to neglect the production of supplies, in the hope of striking a heavy cash balance at the end of the year. This familiar road to ruin was long since abandoned by our best farmers, and it is much to be hoped that the success of last year's operations in Alachua and Levy counties will not invite a repetition of the old disasters upon a new and plausible pretext.

CASSAVA STARCH.

Samples of cassava starch have been sent to England from Jamaica. It is considered that this product may be useful in the brewing of beer. Commercially, cassava starch is unknown in the European market. The value of the starch in Europe (pronounced by United States officers of the Department of Agriculture to be superior to potato starch) cannot be less than £12 per ton in quantity. A London firm could do with from 50 to 100 tons per month. Unfortunately, however, the area of cassava under culture in the island is quite insignificant—*i.e.*, small patches widely dispersed. It was impossible even to secure 15 tons of starch for shipment. Further, there is no machinery in Jamaica for manufacturing starch. The foregoing will show that there is evidently a future for this product if it were cultivated extensively.—*Our Western Empire.*

THE COTTON INDUSTRY.

By cable we learn that 15,000 looms in Lancashire have been thrown out of work in order to restrict the output of cotton goods. We are also told that, in consequence of the increased demand in the United States for their home-grown cotton, the British cotton-spinners are combining to encourage the growth of cotton in British colonies. If cotton-growing is taken up, as it undoubtedly will be, in British West Africa, the owners of the steamship line John Elder and Co. have offered to carry 1,000 tons to England free for the next three years, in order to encourage the growers.

During the last fifty-two years, from 1848 to 1899, that increase has been almost fivefold. The production has risen from less than 2,500,000 bales to over 11,250,000 bales. In 1871, 1,000,000 bales were consumed in the mills of the States. In 1899, this home consumption had risen to 3,632,000 bales. Cotton-mills there have rapidly multiplied, especially in the Southern States, where they consumed 1,415,000 bales—that is, one-eighth, or 12½ per cent. of the total American crop.

The British mills in 1899 consumed 3,519,000 bales, the United States themselves used 3,553,000 bales, and on the Continent cotton-spinners account for more than either of these countries.

The total production in all the American cotton-producing States in 1899 reached 11,256,000 bales, pretty well all accounted for as above. The production of foreign countries in competition with the United States in the production and exportation of cotton amounts to about one-third of the production of the world. Japan consumes practically the whole of the Chinese export—about 36,500,000 lb. In Central Asia, Russia has not yet grown sufficient cotton for the needs of her home industry. Two-thirds of the Persian crop is exported to India and Russia; the export amounts to about 10,000,000 lb.

While India exports about four-ninths and the United States about two-thirds of the cotton raised in those countries, Egypt practically exports all she grows, amounting to over 500,000,000 lb., 43 per cent. of which goes to Great Britain. In India there are some 16,000,000 acres under cotton, producing 3,300,000 bales in 1899. The following tables, showing the average cost of producing an acre of cotton in the United States and the cost of each item in the production of a 500-lb. bale of cotton, are interesting:—

AVERAGE COST OF PRODUCING AN ACRE OF COTTON.

	Dollars.	£	s.	d.
Rent	2.88	0	12	0
Ploughing	2.81	0	11	8½
Seed	0.21	0	0	10½
Planting seed	0.28	0	1	2
Fertilisers	1.30	0	5	5
Distributing fertilisers	0.16	0	0	8
Chopping and hoeing	1.31	0	5	5½
Picking	3.37	0	14	5½
Ginning and pressing	1.08	0	4	6
Bagging and ties	0.57	0	2	4½
Marketing	0.64	0	2	8
Repairing implements	0.40	0	1	8
Other expenses	0.41	0	1	8½
Total cost	$15.42	£3	4	8

The average yield per acre is 255.6 lb. of lint and 16 bushels of seed. Valuing the clean lint at 6.70 cents ($3\frac{7}{10}$d.) per lb., and the seed at 11.9 cents (about 6d.) per bushel, the total return amounts to 19.03 dollars (£3 19s. 3½d.) per acre, leaving a net profit of 3.61 dollars (15s. 0½d.) per acre.*

* I am indebted for the figures and other information given above to the United States Bureau of Statistics, whence has been issued a valuable publication entitled "Cotton Trade o the United States and the World's Cotton Supply and Trade."

COST OF EACH ITEM IN THE PRODUCTION OF A 500-LB. BALE OF COTTON.

	Dollars.	£	s.	d.
Rent	5.65 ...	1	3	6½
Ploughing	5.50 ...	1	2	11
Seed	0.40 ...	0	1	8
Planting seed	0.55 ...	0	2	3½
Fertilisers	2.55 ...	0	10	7½
Distributing fertilisers	0.30 ...	0	1	3
Chopping and hoeing	2.55 ...	0	10	7½
Picking	6.60 ...	1	7	6
Ginning and pressing	2.10 ...	0	8	9
Bagging and ties	1.10 ...	0	5	0
Marketing	1.25 ...	0	5	2½
Repairing implements	0.80 ...	0	3	4
Other expenses	0.80 ...	0	3	4
Total	...$30.15 ...	£6	5	7½

Thus the cost per lb. of cotton amounts to 3.06d.

A similar calculation will show how cotton-growing would pay a planter in Queensland, supposing him to own his land and to grow, gin, and market the cotton himself:—

AVERAGE COST OF PRODUCING AN ACRE OF COTTON IN QUEENSLAND.

	£	s.	d.
Ploughing	0	7	0
Harrowing	0	1	0
Seed	0	1	0
Planting seed	0	1	2
Fertilisers	0	5	0
Harrowing and clearing	0	4	0
Picking 1,000 lb. at ½d. per lb.	2	1	8
Ginning and pressing	1	0	10
Bale	0	2	6
Marketing	0	4	0
Repairing implements	0	2	0
Other expenses	0	2	0
	£4	12	2

Thus the approximate cost of producing and marketing the produce of 1 acre of cotton in Queensland reaches £4 12s. 2d., as against £3 4s. 8d. in the United States, a difference of £1 7s. 6d. The items seeds and fertilisers may, however, be left out of the statement, as the land in East and West Moreton, on which heavy crops of cotton have been produced, is rich enough already, and after the first season farmers would have plenty of seed to exchange with each other.

The average yield of seed cotton per acre in Queensland has been 1,000 lb., which, when ginned, produced about 400 lb. of lint and 600 lb. of seed.

Taking the price of cotton at 6d. per lb., we have—

	£	s.	d.
400 lb. cotton at 6d.	10	0	0
600 lb. of seed at £4 10s. per ton	1	4	1
	£11	4	1
Less cost of production and marketing... ...	4	12	2
Profit per acre	£6	11	11

If, instead of selling the seed, the oil were expressed, the 600 lb. would yield 10 gallons of crude oil, worth £1 0s. 7d., and the resulting oil cakes, if made from undecorticated seeds, would fetch £1 2s. 4d. The decorticated cake would bring

£1 15s. 8d. The hulls which are removed before pressing may also be sold for cattle food.

Thus under favourable circumstances a profit of about £7 per acre may be made by the planter who owns his machinery.

But as circumstances are not always favourable to the farmer in consequence of climatic influences, insect pests, &c., it will be necessary to add 25 per cent., or £1 3s., to the cost of production, making it £5 15s. 2d., and reducing the profit to £5 8s. 11d. per acre.

In a previous article on this subject (*Queensland Agricultural Journal*, Vol. VII., page 542) I showed that the cost of producing an acre of maize is £1 11s. 8d., and that with a 40-bushel crop and maize selling at 2s. 3d. per bushel, the profit is £2 18s. 4d. per acre. The profit on cotton is therefore double that on maize.

I also pointed out that the farmer who merely grows his cotton, picks it at ½d. per lb., and sells it to the ginhouse owner, makes a profit of £3 2s. 2d. per acre, and, if he picks the cotton himself with the help of his family, he keeps the cost of picking (£2 1s. 8d.) in the family, so that he would actually be getting a profit of £5 3s. 10d.

As I have shown on previous occasions, other nations are preparing to compete with the United States in cotton-growing. Russia is rapidly increasing her acreage under cotton in Asia. Germany is determined to enter upon the industry in her suitable colonies. In what is called "Latin" America—that is, in Mexico, Brazil, the Argentine, Peru, Chili—cotton-growing is spreading.

Here in Queensland we have all the conditions needed for a large production, yet we grow wheat in places wholly unsuited to that cereal, below the Range, producing in a good season an average of 20 bushels per acre, worth from £2 to £3, from which all the usual expenses have to be deducted. We grow maize yielding 40 bushels to the acre, worth from £4 to £6, less expenses, often amounting to £2 per acre. And all these lands are capable of producing a crop which will give twice the profit of wheat and maize.

The cotton industry surely deserves a trial once more. Anyone farming from 50 to 100 acres in the Moreton district could spare one or two acres as a trial. If the result prove unsatisfactory, the loss is not very great, but the lesson gained would be invaluable. On the other hand, if it were successful it would not be long before the lands now devoted to a few cows and horses in West Moreton would once again be white with the fleecy crop, and Brisbane, Ipswich, Laidley, and other centres of farming operations would resound with the pleasant hum of the gins.

Over-production is not to be feared. In 1898, Great Britain, the Continent of Europe, the United States, and India consumed 11,976,000 bales of 500 lb. The United States in that year produced 10,897,857 bales, of which only 7,700,528 bales were exported, leaving 4,275,472 bales to be supplied by the smaller cotton-growing countries, of which Queensland should have been one. The price of middling upland cotton in the principal markets of the United States was, in 1898-1899, 6.59 cents (3½d.) per lb.* Prices are expected to increase during the ensuing period.—[Ed. *Q.A.J.*]

We have had so many applications from farmers for a copy of a lecture we delivered at Nelson and at Hambledon, North Queensland, on cotton-growing, in March, 1902, that we make no apology for reproducing the lecture for the benefit of the many new recipients of the *Queensland Agricultural Journal*. The following is its substance as reported in the *Cairns Daily Argus*:—

THE GREAT COTTON CONSUMER.

The lecturer commenced by remarking that 135,000 bales of cotton were imported into America last year from Japan and Peru. America worked up

* Uplands has risen to 6½d. and Sea Island to 1s. 2d. We are given to understand that Dr. Thomatis, at Cairns, has been offered 6½d. per lb., in England for his Uplands cotton.

in her cotton-mills more cotton than Great Britain. Seven million bales were used up in the southern mills of the United States last year. South Sea Island cotton which was grown in Florida last year was sold locally at 2s. 1d. per lb. The price of uplands cotton in America fluctuates in the most extraordinary manner. Last year it ran from 4½d. per lb., clean lint, to 9½d., following which came a drop to 6d. The present price of uplands cotton clean is 9½d. per lb. The cost of producing 1 acre of cotton, putting the crop at the very lowest average of 1,000 lb. seed cotton, is £3 1s. 8d. Supposing a man to gin his own cotton, the cost of production from the first ploughing of the land to the marketing of the cotton, say in Japan, would amount to over £8 for one bale of 400 lb. Freight to Japan from Brisbane is £2 16s. 6d. per ton; the cost of landing the same cotton in England is £7 11s. approximately. These remarks apply to uplands cotton.

PROFITS OF COTTON-GROWING.

The value of uplands cotton in the British market and in the Japanese market is about 4d. per lb., consequently the value of a 400-lb. bale of cotton is £6 13s. 4d. It would, therefore, appear that there was no profit to be gained by the export of cotton to either country, but, whereas formerly the seed was absolutely valueless, now undecorticated seed is worth from £4 10s. to £6 per ton, whilst decorticated seed is worth from £7 to £8 per ton. The hulls and remaining lint, of which a ton of seed will give 1,000 lb., are worth as paper material from £4 to £8, and a new process has been discovered of extracting the oil, by which farmers will receive about 30s. a ton more for the seed. The refined oil sells at 3s. 4d. per quart in sealed cans. Furthermore, the cotton seed being crushed produces 37 gallons of oil per ton, and cotton-seed oil is worth from £23 to £24 per ton. Again, after the extraction of the oil we have the oil-cake for cattle food. Oil-cake is worth £7 per ton. It will thus be apparent that the by-products of cotton are worth far more than the actual cotton lint itself. Uplands cotton is an annual which may be pruned, but it is not worth while to do so. Sea-Island cotton, on the contrary, pays for pruning; when not pruned, it runs to wood. When pruned, it is somewhat similar to coffee, and produces large crops which often amount to 9 lb. weight of cotton in seed. This means 3 lb. of lint. Sea-Island cotton at the present moment is sold in the Southern States of America, where it thrives to perfection, at 2s. 1d. per lb.

It is possible a market for Australian-grown cotton could be found in Japan, which is much closer to us than England; the price paid there is 5½d. per lb. for clean uplands cotton. The cotton-mills in the Southern States of America and the Gulf work up far more bales of cotton than the United Kingdom. Seven million bales, which formerly went to Manchester, are now used up in the States cotton-mills.

We have no experience in the Cairns district of the yield of uplands or white seed cotton, all the cotton hitherto grown up here being clean black-seed Sea-Island, but in the South a yield of from 1 to 1½ lb. of clean cotton per bush is considered a very fair crop. There the cotton is planted in rows 6 feet by 5 feet (the former being the distance between the rows), giving 1,200 bushes per acre. This means, at 1 lb. per tree, 1,200 lb. of clean lint. Calculating the value of this lint at 5d. per lb., you have £25, from which must be deducted the cost of cultivation and picking, which amounts to £3 18s. Those who wish to make the calculation for themselves can do so by noting that the cost of picking cotton is ½d. per lb. and the cost of ginning is ¼d. per lb. Each bale costs 2s. 6d. for cartage, freight, insurance, and commission. One of the most important factors in shipping cotton is dumping. Two 400-lb. bales are dumped into one, and the Brisbane shipping agents as a rule charge nothing for dumping. To sum up the whole matter, the net profit on 1 acre of cotton, at the very low average of 1,000 lb. of seed cotton or 400 lb. of lint, is over £5 per acre.

* This has now nearly been accomplished by Dr. Maxwell, by means of irrigation and manuring.

BETTER THAN OTHER CROPS.

Now compare this with the profits on rice, sugar, wheat, and maize. Without going into figures, it can be shown that the net profit derived from wheat is under £2, from rice under £6, and from maize under £2 per acre. Supposing that a crop of sugar-cane reaches 20 tons an acre (we live in hopes that Dr. Maxwell will show us how to produce 100 tons an acre*), that would, at 10s. a ton for the cane, amount to £10 an acre, from which must be deducted the cost of cultivation, trashing, cutting, and loading, leaving the small sugar-grower but a living wage.

It has been asked: Will it pay the cotton-planter to pick it? Like coffee, cotton is essentially a working man's crop (the term "working man's crop" is used as distinguished from a "poor man's crop," as coffee has been called, because the "poor man" cannot grow it). An able-bodied working man can cultivate, pick, and market 10 acres either of coffee or of coton if he has a family of children old enough to go into the field. These children earn for him ½d. per lb. of his crop, consequently, if he has their assistance, the cost of picking can be eliminated. (Parents might object to their children being taken from school to pick cotton, but between the years 1864 and 1880 the Education Department arranged the children's Christmas holidays in such a manner that the bairns were available to pick the cotton at the proper season.)

A PERENNIAL OR AN ANNUAL?

Is cotton a perennial or an annual? It is both. Sea-Island cotton may be grown for several years in succession by pruning. Uplands cotton (woolly seed) may be pruned, but it is not worth while, except to produce a very early crop.

TO COTTON-PLANTERS.

The following warning might profitably be given to cotton-planters. Never pick cotton until the dew is dried off it. When picked, lay your cotton in the sun for three or four hours, but take it in before sundown. At the very first appearance of one white boll pick it, and continue to pick as long as the white bolls appear. Never leave the cotton which has burst out from the bolls for one single day in the field, otherwise it will turn yellow.

COTTON-PICKING MACHINES.

Several cotton-picking machines have been invented in various parts of the world, one of which was expected to solve the question of hand labour. It was a machine which was provided with brushes and rolled over the cotton—that is to say, two discs were fastened to an arched attachment, enabling the discs to run on both sides of the cotton plants. The theory was that the brushes would tear the cotton from the bushes, the cotton being subsequently carried away to a receptacle by combs. This machine, however, proved a dead failure. The latest and most approved patent is a pneumatic machine worked by powerful suction, somewhat on the principle of the sheep-shearing machine. The machine passes along the cotton-field, one man on each side of the trolly from which the suction power is conveyed. Briefly speaking, this machine consists of one or two or more pneumatic tubes, which, when presented to a perfectly ripe cotton boll, immediately suck it into a receptacle in rear of the power. (It has been stated in American papers that this machine will perform the work of cotton-picking in one-hundredth part of the time formerly required by hand-pickers.)

IN CONCLUSION.

Major Boyd informed us that, whilst South Sea Island cotton could not be profitably grown in the Southern part of the State, although the plant throve remarkably well, it would, he considered, flourish in this district. As will be seen from the above, it is far the more valuable kind of cotton. Cotton-growing, moreover, would not present the same difficulties from a labour point of view as sugar-growing. Cotton is, we are assured, even more easily picked than coffee.

We hope some of our farmers will profit by Major Boyd's good advice and information on the matter of cotton-growing, and endeavour to establish an industry as a result.

We would certainly not advise any planter to give up sugar-growing for the sake of cotton. Sugar is the great stand-by of our coastal lands, from the Tweed to Cairns. We believe that there is no other crop which will repay farmers for their labour so well as sugar, always provided that two factors necessary to success in the sugar industry are present—water and reliable labour. But all planters and farmers could put in from 1 to 5 acres of cotton as a by-crop, and we feel sure that this little addition to their cultivation would well repay them.

SWEET POTATO SUGAR IN FORMOSA.

The Island of Formosa will soon become, under the wise economic administration of Baron Kodama and Dr. Goto, one of the great sugar-producing regions of the world. There is an almost unlimited market throughout the Eastern world for sugar, and the Japanese Administration in Formosa is wisely availing itself of the splendid opportunity for developing and supplying this market. It is estimated that at least one-half of the island is adapted to the growing of the sweet potato for sugar manufacture. The climate is moist and favourable, and the soil is as fertile as that of the Hawaiian Islands or of Java. The range of temperature is from 75 to 100 degrees Fahr. The sugar section extends from the middle to the southern end of the island, and in this section rain occurs every day from May until the latter part of September, which is the growing season, and then there is no rainfall whatever until the following May, affording a perfect season for harvesting. The first sugar company was established about two years ago. In 1901 the product of sweet potato sugar was 20,000 bales, and last year it was estimated that it would reach 60,000 bales. The profits of the industry are encouraging, as 1 acre of land will produce 40,000 lb. of potatoes—worth about 80 yen, or $40 (gold)—and manufacturing expenses is only 75 cents for 1,000 lb. of sugar. Wages are low, a labourer receiving only about 12 to 16 cents a day. In such circumstances there is no reason for astonishment at the rapid development of the industry.—*Straits Times*, 24th January.

IRRIGATED CANE AT BINGERA.

We have been favoured by Messrs. Gibson and Howes, proprietors of Bingera Sugar Plantation, near Bundaberg, with some interesting information concerning the irrigated crops on the estate. Twelve months ago, after visiting Bingera, we described the irrigation works and method of irrigation adopted by the proprietors. Our article on the subject concluded as follows:—

"The crucial test, however, will, after all, be in the determination of the sugar content of the canes when they are ready for the mill. If the crop reaches 50 or 60 tons of cane per acre, and a ton of sugar can be made from 8 tons of cane, a slight calculation will serve to illustrate the great value of scientific cultivation, irrigation, and manufacture."

Circumstances having prevented us from visiting the plantation last month, the Hon. Angus Gibson, on our request, has courteously supplied the following:—

Regarding the sugar content of irrigated canes, I have not the least hesitation in saying that for quantity of juice and quality our irrigated canes of last year were better than anything ever passed through our hands.

Before me I have our chemist's report of an analysis of an 11-months irrigated old cane, of 29th July, showing:—Brix, 19.49; cane sugar, 17.66; fruit sugar, 0.71; and another, of 28th August:—Ratoon crop, 20.09; cane sugar, 18.90; fruit sugar, 0.09. These figures speak for themselves, and are not picked samples.

Regarding the tonnage off irrigated lands, this matter requires careful reply. Enthusiasts put Bingera crop down last year considerably over the mark, but all the same it was a great testimony to what can be done in a season such as 1903 was, when our rainfall for the crop was 8½ inches only. With or without irrigation, you are aware that certain conditions more or less govern the crop results, such as, for instance, quality of the soil, thorough and proper tillage before planting, healthy plants, length of growing season, and weather, fertilisers applied, &c. With irrigation, besides the above, the cane requires good water, and plenty of it, properly applied during the growing season. Last year's crop did not have by any means a fair trial. We had only irrigation for four growing months, and our land was by no means properly laid out for irrigation. Again, the crop was almost ruined before the water was applied.

This year's crop is equal to if not better, so far, than last year's, with a rainfall of 9½ inches, not including May, and irrigation only from 6th January. We have not yet thoroughly determined the value of fertilisers with irrigation, but, putting our short experience alongside Hawaiian experience, it appears to us that it is in judicious but plentiful fertilisation that the tonnage results become a practical certainty. My idea is that for a certainty a crop of 30 to 50 tons can be reaped under the conditions I have named.

Last, but not least, a good, economical, and reliable plant is the first requisite to obtaining best results from irrigation. For large systems this matter cannot be too highly impressed on intending irrigationists.

EXPERIMENTS WITH FLAX.

In an article in this issue on "Ramie," a statement occurs to the effect that the return of flax per acre for the past 10 years has been 3 cwt., at 50s. per cwt. In this connection, we find from experiments made at the Experimental Farm for the North-West Territories of the Dominion of Canada, at Indian Head, Assiniboia, that the flax-growers of Canada obtain a much higher yield, as is shown by the following table:—

Seed per Acre.	Size of Plot.	Date of Sowing.	Date of Ripening.	Number of Days Maturing.	Length of Straw.	Weight of Straw.	Yield per Acre of Seed.	Weight per Bushel.
Lb.	Acre.				Inches.	Lb.	Bush. lb.	Lb.
40	$\frac{1}{20}$	15 May	15 Aug.	92	30	2,480	18 12	56
80	$\frac{1}{20}$	15 ,,	15 ,,	92	30	2,680	17 38	55½
40	$\frac{1}{20}$	22 ,,	20 ,,	90	30	2,960	19 36	56
80	$\frac{1}{20}$	22 ,,	20 ,,	90	30	3.380	21 36	55¾
40	$\frac{1}{20}$	29 ,,	20 ,,	83	30	2,520	21 4	56
80	$\frac{1}{20}$	29 ,,	20 ,,	83	30	2,720	22 40	55¾

At Traralgon, Messrs. Woolfe Bros. have obtained a net profit on 170 acres of flax of £7 per acre. The average crop is 6 cwt. of clean fibre and 15 bushels of seed per acre, the seed being worth about £14 per ton, and the fibre from £46 to £52 per ton. This would give a return of just double that of the Irish flax-growers.

The flax crop of the world produces annually, on the average, from 60,000,000 to 70,000,000 bushels of linseed. About 95 per cent. of the linseed is in four countries, viz.:—Russia, India, Argentina, and the United States. Russia produces about 32 per cent.; the United States, 31 per cent.; India, 18½ per cent.; Argentina, 14 per cent.; and all other countries combined, 4½ per cent. Flax is also largely grown for the fibre only. The world's commercial crop of flax fibre is practically all grown in Europe, none of the flax-growing countries outside of Europe being engaged in this branch of the industry. They grow flax exclusively for linseed. The flax crop of the world for fibre yields about 1,500,000 lb. annually. Of this quantity, about 75 per cent. is produced in Russia, the remaining 25 per cent. being the combined production of the rest of Europe.

4

MANURE FOR SUGAR-CANE.

The most important manure for sugar-cane is potash. When it is considered that, according to some analyses, a crop yielding 10 tons of sugar removes 1,142 lb. of potash, it will be seen how very important it is that the supply of this soil constituent be kept up. To illustrate this necessity we will take an experiment carried out by Mr. W. Tiemann, Director of the Agricultural Experiment Station, Cheik Fadl, Upper Egypt, in 1900-1901. This experiment demonstrates the advisability of using a complete manure. Mr. Tiemann took a field of plant cane, grown on a light soil near the desert, and divided it into three plots. The result is here shown:—

Plot.	Manure per Acre.	Yield of Cane per Acre.	Percentage of Sugar in Cane (Digested).	Sugar per Acre.
		Tons cwt. qr.	Per cent.	Tons cwt. qr.
(A)	No manure	19 10 0	13·2	2 11 2
(B)	1½ cwt. nitrate of soda ... 5½ cwt. basic slag	25 4 3	13·9	3 10 1
(C)	1½ cwt. nitrate of soda ... 5½ cwt. basic slag ... ... 1¾ cwt. sulphate of potash ...	26 10 2	14·2	3 15 1

TOBACCO NOTES.

BY R. S. NEVILL.

ENORMOUS STOCKS CONTINUE A FEATURE OF THE ENGLISH MARKETS.

Successful efforts at keeping plant beds warm have been tried with lamps placed under the bed-covering during chilling weather. This might be tried as preventive of blue mould during damp, foggy, and chilly weather.

It is reported that a crop of shade-grown cigar tobaccos in Connecticut, U.S.A., sold at 12s. 6d. to 15s. per lb.

At the St. Louis Exposition, 10,000 square feet of space has been given to tobacco, and of this 5,000 square feet go to Kentucky.

A NEW METHOD FOR CURING TOBACCO.

A new method for assisting the cure of tobacco in the barns has been devised by G. F. Hillman, a Massachusetts man, who has organised a stock company with $100,000 capital to place the curers on the market.

It consists of a furnace and a gasoline engine on a truck, which is placed close to the curing-barn, and hot air is forced into the barn through a pipe by means of a blower. The pipe may be extended into sections if desired, or the curer can be moved from one side of the building to another. The whole object is to force the warm air into the curing-shed, so as to drive out the moist air within, and hasten the curing of the leaf.

OIL OF TOBACCO.

Some interesting investigations have just been published by the analysts of the Government laboratory with respect to what is known as the "oil of tobacco" (says the *Smoker's Magazine*). In making up raw leaf tobacco into the article with which we fill our pipes, manufacturers use olive oil. In order to protect the smoker the British Legislature has enacted that not more than 4 per cent. of olive oil shall be used for "making up" or "flavouring," and the business-like manufacturer has sometimes complained that this 4 per cent. is not a sufficient allowance, because the tobacco leaf itself supplies an oil which might be mistaken for the manufacturing product. The Government analysts have, therefore, experimented with forty-six tobaccos, and they find that the essential oil of tobacco usually exists only in the smallest of quantities, sometimes not more than .05 per cent. The oil is a paraffin—technically a paraffin hydrocarbon.

TOBACCO IN BOTANY.

The tobacco plant is an annual—*i.e.*, it springs from seed each year. Of its fifty varieties all except two are indigenous to America. These two exceptions are *Nicotiana suaveolens*, native to the Australian colonies, and *N. fragrans*, which was discovered in New Caledonia. The best species are the following:—

1. *Nicotiana tabacum*, of which there are two species, *Macrophylla* (Maryland) and *Angustifolia* (Virginia). Each of these is divided into several varieties, among which are included the famous tobacco of Cuba and of Manila, distinguished by the form of the leaves. The leaves of these sorts are fine, soft, and thin, and serve as wrappers. To the second class belongs the tobacco called Latakia.

2. *Nicotiana rustica*, better known as Hungarian tobacco, is largely cultivated in Europe, in Asia, and in America. Of this kind there are two varieties, one with a large leaf and the other with a small leaf, both producing a tobacco of good quality.

3. *Nicotiana persica*, a form of *N. tabacum*, is produced by climatic influences, although it was long thought to be a separate species.

4. *Nicotiana crispa*, a species grown in Syria and on the coast of the Mediterranean.

5. *Nicotiana repanda* is a species native to Mexico. It has small leaves, which are used to give to the Mexican cigars their peculiar aroma.

The other sorts have no commercial importance, and are interesting only to the botanist.

Edwards, Goodwin, and Co., Liverpool, report as follows:—

Stocks: 30th April, 1903—121,533 hogsheads.

Stocks: 30th April, 1902— 91,074 hogsheads.

Prices.

STRIPS.	1903.	1902.
WESTERN—		
Fillers	— @ 5	4½ @ 5
Rather short	5¼ ,, 5¾	5¼ ,, 6
Very middling to middling	6 ,, 6¾	6¼ ,, 6¾
Good to fine	7 @ 7½ @ —	7 @ 8 @ —
BURLEY	5½ ,, 8 ,, —	5¾ ,, 8 ,, —
VIRGINIA DARK—		
Fillers	5 @ 5½	5¼ @ 5¾
Rather short	6 ,, —	6 ,, 6¼
Very middling to middling	6½ ,, 7½	6½ ,, 7½
Good to fine	8 ,, 10	8 ,, —
VIRGINIA and CAROLINA BRIGHT—		
Semi-dark	6 ,, 6½	— @ 7½
Semi-bright	7 ,, 8½	8 @ 9 @ —
Medium or mixed ...	9 @ 10½	10 @ 11
Good to fine	11 @ 12 @ 14	11¾ @ 12½ @ 14

LEAF.	1903.	1902.
WESTERN—		
Common export ...	— @ —	— @ —
African export ...	— @ 5 @ 6½	— @ 5 @ 6½
Short trade ...	— @ 4	— @ 4
Medium to good trade	4½ ,, 6	4½ ,, 6
BURLEY	6 @ 7 @ 8	7 @ 7½ @ 8
VIRGINIA DARK—		
Common export ...	— @ —	— @ —
Short trade	— ,, —	— ,, —
Medium trade ...	4 ,, 5	4 ,, 5
Good to fine trade ...	5½ ,, —	5½ ,, —
VIRGINIA and CAROLINA BRIGHT—		
Common or semi-bright	— ,, 6½	6 ,, 7
Medium or mixed ...	7½ ,, 10	8½ @ 10 @ —
Good to fine	10½ @ 11½ @ 15	11 ,, 12 ,, 15

Delivered for home consumption, March, 1903—6,803,876 lb.

Delivered for home consumption, March, 1902—6,098,076 lb.

The improved demand in this market noticed in our last issue continued during April.

Science.

A NEW FIRE EXTINGUISHER.

Invention in the direction of appliances for extinguishing fire in houses, barns, stockyards, &c., is always moving along in many directions, and such appliances have appeared at intervals of more or less utility. The latest invention to make its appearance in the field is one introduced by the Federal Dry Powder Fire Extinguishing Co. Mr. Green, the energetic agent who is pushing the invention in Queensland, gave a most interesting and instructive demonstration of the effectiveness of the powder at the Queensland Agricultural College last month, in the presence of the Principal and staff and students of the College, which proved the practical efficiency of this powder. Of course we know nothing of the composition of the powder, which is contained in tubes, beyond conjecture. It would seem that either carbonic acid gas is evolved as soon as the powder comes in contact with the flames, or that the inrushing oxygen from the air is in some manner destroyed. However that may be, the following is what we witnessed on the occasion referred to:—

A large case with one side and top knocked out was filled with timber liberally besmeared with tar and saturated with kerosene, which, on being set fire to, immediately burst into a roaring flame. After being allowed to burn some time, at a signal from the Principal, Mr. Green stepped forward with a tube of powder, and, throwing some of it at the base of the fire with a swinging movement of the tube, actually seemed to wave the flames out. Oil, &c., was again applied, and when the case was a raging mass of flames it was again put out in less time than it takes to write these words. At the request of the Principal, a cock of hay was next fired, and treated with astonishing results.

Snapshots were taken by Mr. Mobsby, Artist to the Agricultural Department, showing the events before and after using the powder.

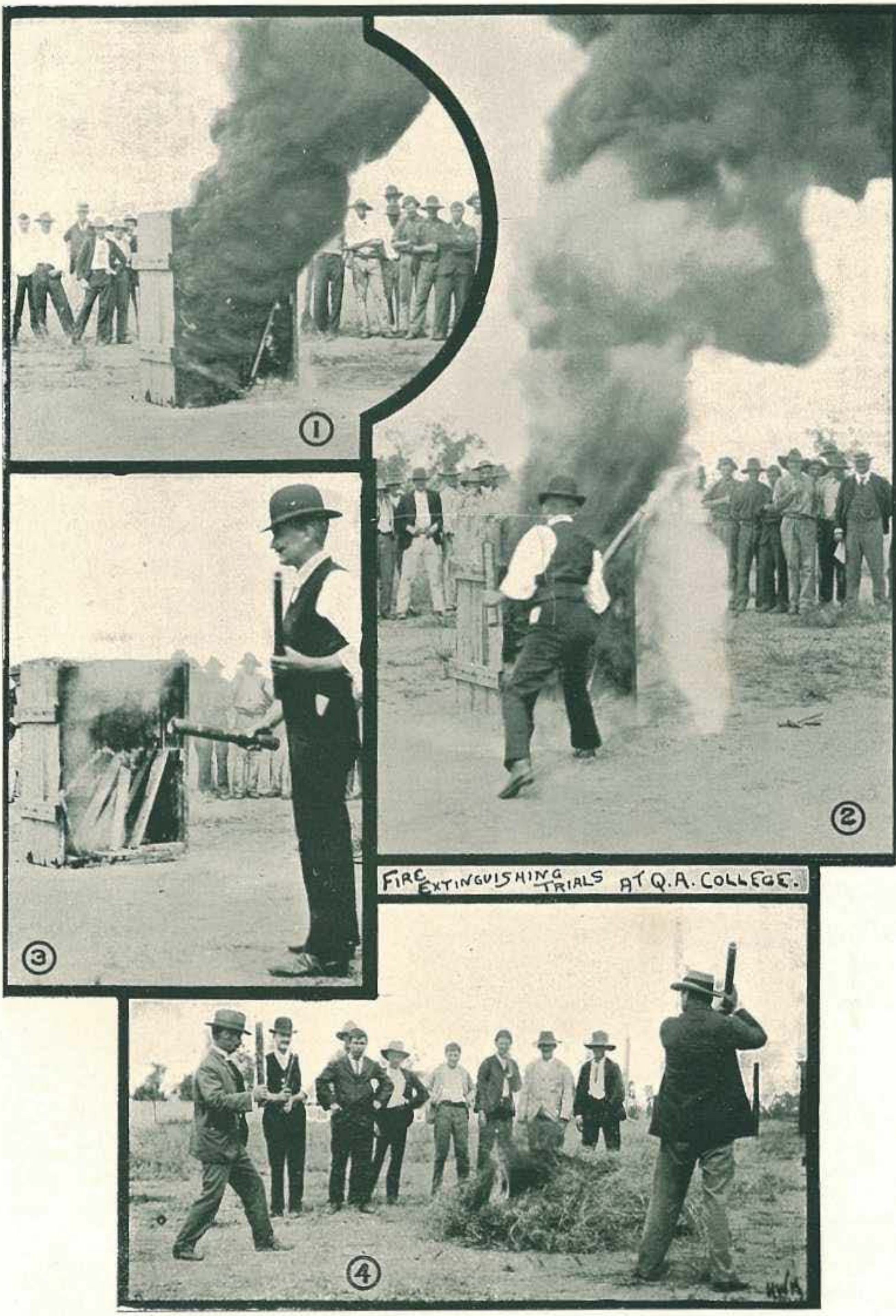
The powder is supplied in tubes 22 inches long and 2 inches in diameter, and will doubtless before long be found in most prudent persons' houses as a safeguard against that dread evil—fire. It is so effective and so simple in application that a child may use it. The company's offices are 278 Elizabeth street, Brisbane, where experiments may be witnessed by anyone interested.

A WONDERFUL PROSPECTING INSTRUMENT.

We have frequently been asked if the divining rod used in finding underground water could not be made available for finding gold or other metals. Naturally the answer has been an emphatic negative. To-day, however, the seemingly impossible is said to have come to pass through the ingenuity of Messrs. L. Draft and A. Williams, of Meadow House, Ealing (England). These gentlemen have invented an electrical ore-finder, by the use of which gold, tin, silver, copper, or iron bearing reefs can be accurately located. Numberless experiments have been made, and all go to prove that the invention is not an imaginary thing, but a solid fact. This will, when placed on the market, completely revolutionise the work of the prospector, saving him many months of hard sinking and outlay of cash. It is said that the instrument works much in the same manner as the divining rod—*i.e.*, by attraction to metals lying at considerable depth.

The *Scientific American* of 2nd May, 1903, publishes a most interesting article on this subject, and we reproduce it in this issue with the object of disseminating the discovery far and wide. Many of our subscribers are engaged

Plate IV.



EXPERIMENTS WITH A NEW FIRE EXTINGUISHER AT GATTON COLLEGE.

in farming in the mining districts of the State, and will doubtless be interested in the matter, combining, as many do, mining with farming. The *Government Mining Journal* will certainly have something to say on the invention, but, as that *Journal* may not be available to many farmers interested in mining, we for once take up a subject apparently foreign to an agricultural journal.

The writer of the article under notice says that he recently had an opportunity of witnessing the new Draft-Williams method of electrical ore-finding in operation on actual mineral lodes at the Telacre Mine, Prestatyn, North Wales. The inventors, Mr. Leo Draft and Mr. Alfred Williams, claim to be able to detect the presence of certain mineral ores invisible to the eye, and during the last few months have located, traced, and mapped out metalliferous deposits of various natures which were quite invisible to the prospectors and undiscoverable by mining engineering. In many cases, mine prospectors have made borings and opened up lodes solely on the strength of the inventors' predictions, and have discovered new and unsuspected sources of mineral ores, which are now being worked at a profit. It is claimed that by the Draft-Williams method not only can

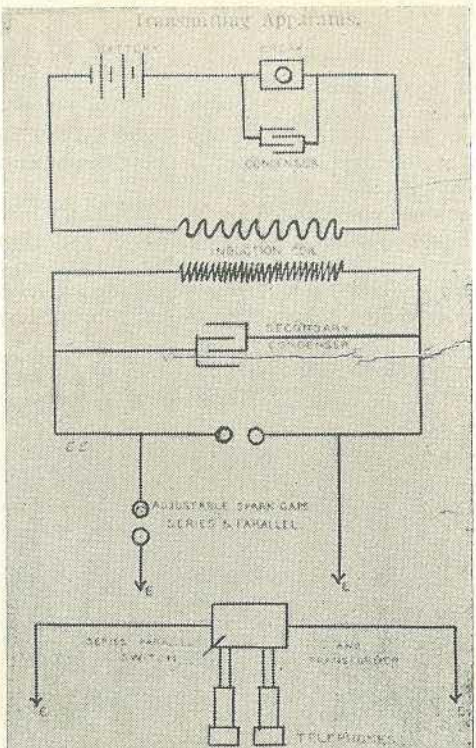


DIAGRAM OF THE DRAFT-WILLIAMS SYSTEM OF ORE-PROSPECTING.

deposits be located, but that the extent and depth of the lode can be determined with an accuracy that is quite impossible with any existing system of prospecting. The writer then proceeds to describe the instruments employed and how they work. It appears that a certain portion of the apparatus, by emitting sundry noises, discloses the position of a mineral lode, the noises always being loudest when immediately over the lode. The area to be energised by the electric waves may be as small as 300 square feet and as large as 30 square miles, and the terminals may be placed hundreds of yards apart.

It was in 1899 when the inventors commenced to experiment with electric methods of ore-finding, and the first practical experiment with their present system was made in Seattle, Washington Territory, and San Francisco, California. These met with success, and the next trials were made in the South-eastern Alaskan archipelago.

Coming to England, they have achieved considerable success in prospecting for lead and zinc ores in Wales and for nemalite (fibrous magnesian hydrate) in Cumberland.

The following is an instance of successful prospecting with this method:—

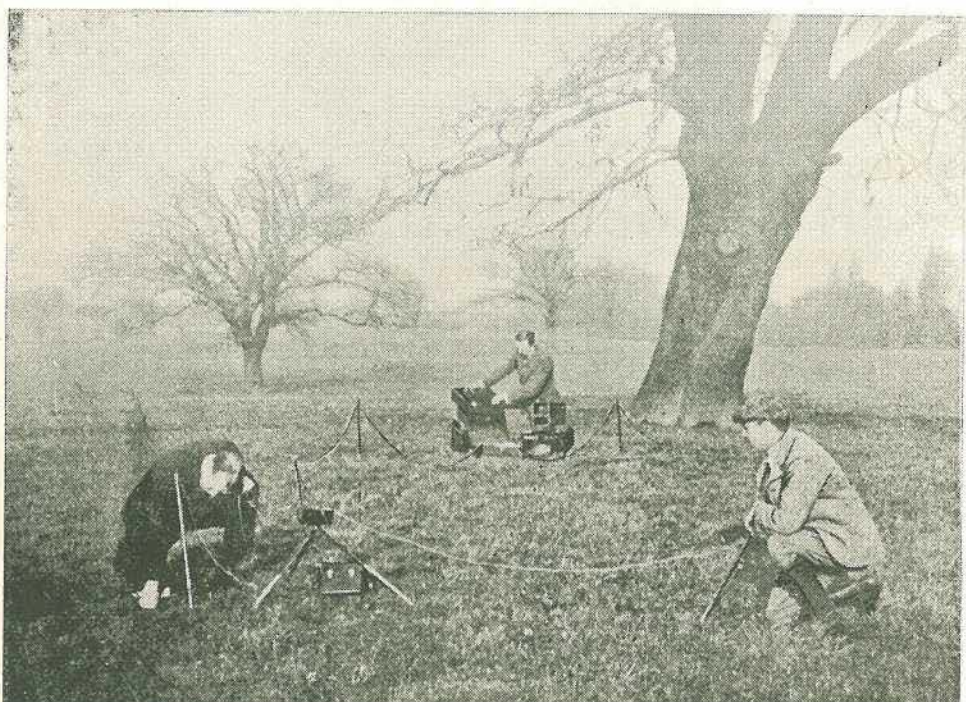
The lead and zinc mines at Cymstwth, Devil's Bridge, Cardiganshire, owned by Mr. H. Gamman, have been worked for the past 1,700 years, and a good-paying lode was found to cease suddenly in one direction. After costly and numerous attempts to discover this lode beyond the fault, the attempt was abandoned.

Mr. Williams, being called in, placed his two electrodes at a considerable distance from the broken lode on unmined ground, and in such a position that a perpendicular through the centre of the line joining the two electrodes would coincide with the run of the lode as worked out.

The current streams from one electrode to the other would thus, under normal conditions of homogeneity, pass at right angles through the extension of the lode if it existed beyond the fault.

Exploring with the resonators, Mr. Williams found on the hillside that the line of normal current flow was in several places rotated through a very considerable angle. After careful mapping out of the results obtained, the direction of the lode was finally predicted.

A tunnel was at once commenced by Mr. Gamman's instructions, with the result that a good lode of lead and blend was discovered after a drivage of less than 3 fathoms (18 feet). Mr. Gamman told Mr. Williams that, in proof of his belief in his *modus operandi*, he had ordered a third drivage to be started to reach the rich ore detected by the instruments at a lower level.



ORE-PROSPECTING BY MEANS OF ELECTRICITY.

"Had your instruments," writes Mr. Gamman, "been discovered years ago, it is my opinion that tens of thousands of pounds would have been saved in these mines alone."

The whole outfit is simple, and easy to work with. Its development during the next few years will be watched with interest by all interested in mining operations.

The Editor adds: While this method of finding ore enables the prospector to detect and locate a body which is a good conductor of electricity, it, on the other hand, offers him no guarantee that this conductor is valuable ore; for any metal substance, such as iron piping or a piece of wire, or, better still, a stratum of moist earth or a subterranean stream, would affect the detecting instrument and indicate a vein of ore. Nevertheless, though this be so, the Draft-Williams system should be of valuable assistance to the prospector, because it reduces greatly his chances of failure by assuring him of the location of some good conducting medium, which can then be further investigated by boring or some other test.

A NEW USE FOR SUGAR.

Every day some scientific man presents to the world an idea which may or may not be of commercial value, however interesting from a scientific point of view. This time it is the utilisation of sugar (why not molasses?) for the purpose of the so-called vulcanising of timber.

As the result of experiments, a method of so treating timber as to secure even from soft wood a largely increased toughness and hardness is reported to have been invented by Mr. Powell, a Liverpool merchant. The treatment to which the timber is subjected is that of saturation at boiling point with a solution of sugar, the water being afterwards evaporated at a high temperature. The result is to leave the pores and interstices of the wood filled in with solid matter, and the timber "vulcanised," preserved, and seasoned. The nature of moderately soft wood, it is claimed, is in this way changed to a tough and hard substance, without brittleness, and also without any tendency to split or crack. It is also rendered remarkably impervious to water. Hard woods, similarly treated, derive similar benefits. Moreover, it is claimed that the process may be completed and timber turned out ready for use in a few days. The invention, which has been patented, is to be brought before the attention of the timber trade by a series of practical demonstration and lectures.

COTTON FROM WEST AFRICA.

At a meeting of the African Trade Section of the Liverpool Chamber of Commerce, held recently, it was reported by a member of the committee that 26 bales of cotton grown in West Africa from seed supplied by the chairman had arrived in Liverpool, and had been sold at 5½d. per lb., or at ¾d. per lb. more than "middling American," for the purpose of being used as a substitute for "rough Peruvian" for mixing with wool. Sir Alfred Jones reported that the Government had undertaken to carry all cotton grown in West Africa free over the Lagos and Sierra Leone Railways for a period of two years, from 1st January current, provided Messrs. Elder, Dempster, and Co. would undertake to carry the same to this country free for the same period. Sir Alfred states that his firm would undertake to carry at least 1,000 tons free for the period named.

Entomology.

CHEESE MITES.

By HENRY TRYON, Entomologist and Vegetable Pathologist.

In June, 1903, a representative of one of the local cheese and butter factories submitted some dust-like material, almost wholly composed of "insects" in various stages of development. The matter, he stated, had been derived from the cheese-room of the factory. In this the "insects" occurred in immense numbers, crawling over the cheese-cloths in which the ripening cheeses were wrapped, and massed together in little heaps upon the shelves upon which they reposed, surrounding the bases of the cheeses or even beneath them. He also stated that in handling the cheeses the minute animals got transferred to the persons of the operatives, and that when established in this position they occasioned a very severe irritation of the skin, suggestive of an attack of prickly heat (*Lichen tropicus*) in a very severe form. This was especially pronounced, he stated, in the case of the arms and chest. The air of the cheese-room wherein they had become established was abnormally dry and cold, being ventilated by a fan and cooled by aid of a refrigerator.

On examining the mites—for such they are—they are found to be one of the three kinds occurring upon cheese, and are examples of *Tyroglyphus siro*, Linn. They comprise examples of this acarus in all stages of existence. Its designation, "Tyroglyphus," signifies sculptor of cheese.

It is not, as far as can be ascertained, on record that the *Tyroglyphus siro* has caused the unpleasant symptoms, referred to, in the case of persons having occasion to handle cheese infested by it, but a mite identified with it has been frequently met with in immense numbers beneath the rind of stored vanilla pods, especially at Bordeaux, and found affecting such of this commodity as is received from Mauritius, Bourbon; and in this case those manipulating it become the subject of a very pronounced skin-affection, that is recognised by French physicians as *Vanillisme professionel*, and has been the object of a special memoir from the pen of Mons. A. C. Layet.

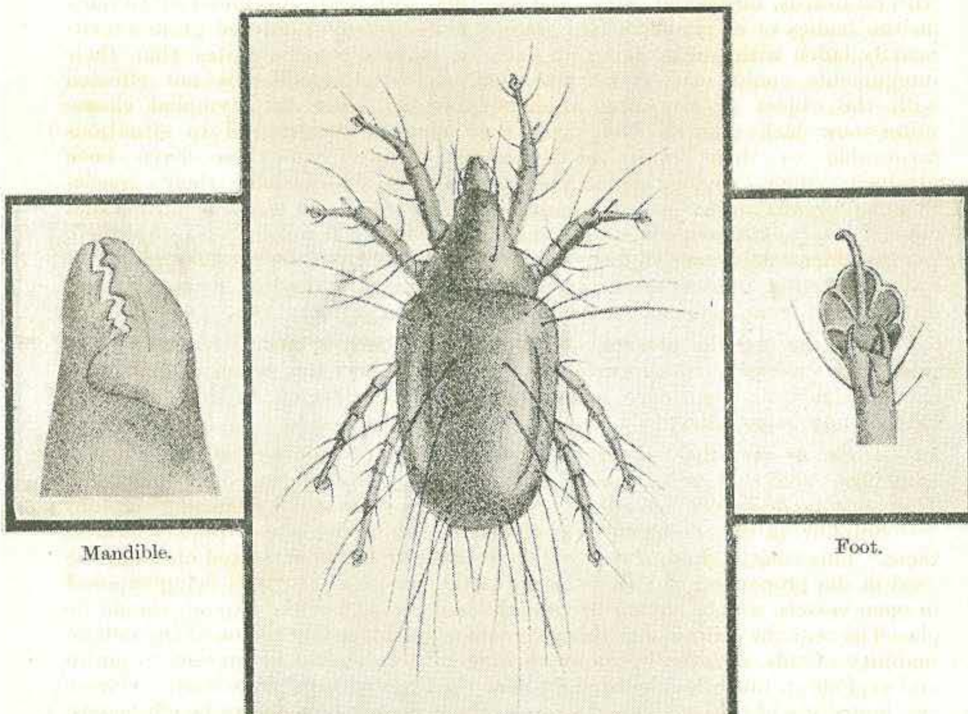
The acarus, however, is better known as an object whose presence in enormous numbers therein has bestowed on cheese in connection with which it occurs a special value in the eyes of those whose unregulated appetites lead them to be partial to it when so conditioned. Not only so, but in certain parts, both of Germany and France, special care is taken in some establishments where cheese is manufactured to even cherish the existence and foster the increase of the mites. Thus, when cheeses have arrived at a certain stage of manufacture, it is the custom therein to introduce the *Tyroglyphi* that they may become infested by them, and so a "Fromage à mites" be produced.

By the agency of the mites, an appearance of false maturity is brought about, a more or less thick-coloured crust being produced, whilst the interior is still pale, and lacks the piquant flavour characteristic of good cheese, that in consequence of their operations is replaced by one of an acid character. Subsequently, when the rind becomes fissured in drying, the tiny animals pass to its interior, and convert more or less of its substance into a brown animated dust, composed of the acari in various stages of development, their eggs, their cast skins and other dejectamenta, and fungus organisms, whose growth is supported by these, as well as by the fragments of the altered cheese itself that are also present.

A French writer, Cosson, in an article entitled "Le Tyroglyphe ou Ciron du Fromage," has exposed the folly of this procedure and the repugnant sentiment with which, in his opinion, mite-infested cheese should be regarded.

He also has drawn attention to the rapid, abnormal, and irregular fermentation, contrary to all the rules that should direct cheese manufacture (in which the process should, on the other hand, be of a gradual and definite character), that the presence of them in connection with ripening cheese may give rise to.

To produce the statement made by the French pharmacist alluded to: The mites, moreover, are distinguished by a prodigious fecundity when they are located in conditions favourable to them. They multiply thus with such rapidity, indeed, that when placed on cheese at about 25 degrees C. (45 degrees Fahr., the most favourable temperature, nearly, to maintain in a room devoted to the ripening of cheese), two individuals may produce more than 20,000 by the end of a month.



Mandible. Foot.

Adult Female. × 100.

CHEESE MITE (*Tyroglyphus siro*, Linn.). See *Canestrini.*

It is this great capacity for increase that renders them available for the use above specified, and at the same time explains how a cheese room or store may become rapidly infested with them, with the undesirable result that the injury, which, as is seen they may inflict on human beings, constitutes.

Under ordinary circumstances, the cheese mite is represented by the following successive forms:—(1) Egg; (2) larva, with three pairs of legs; (3) nymph, with four pairs of legs, but without sex organs; and (4) adult, with four pairs of legs, and sex-organs also. The active ones, 2, 3, and 4, except with regard to the features mentioned, have both similar conformation and feeding habits.

Under exceptional circumstances, however, *Tyroglyphus* can occur under still another form, as happens also with the species of several other genera of the family of mites in which it is included. This is spoken of as the migratory nymph, in respect to its habits, and the hypopial nymph, in commemoration of the fact that the mite, when in this transitory state, was formerly regarded as an example of an independent acarus, and named *Hypopus*. It is alone presented when the food supply upon which the mites are subsisting has become exhausted, and they can, therefore, be no longer sustained, or when exceptionally dry conditions have supervened to render their existence precarious. Under these conditions, both larval and adult mites may perish. On the other hand, the nymphs undergo great changes, both in habits and appearance, becoming covered with a dense cuirass-like shield, developing groups of sub-abdominal suckers, and strong, solid, terminal feet-claws, but loosing mouth, vulval, and anal openings. Under this guise they wander afield, and, with the efficient claws alluded to, grasp, and with the suckers fasten themselves to, such animal as they may succeed in coming in contact with. These migratory nymphs, P. Mégnin has met with on lizards, birds, and cattle, and identifies with acari also found by Gerlach on the bodies of elephants. The present writer has encountered grain-weevils heavily laden with them, being, in fact, so covered by the mites that their integuments could scarcely be discerned. This attachment is not effected with the object of acquiring a change of diet, since the nymphal cheese mites now lack mouths; but that they may be transferred to situations favourable to their continued existence. And when these have been attained, their roving habit ceases to be manifested, their special nymphal organs an investment are discarded, and the form of the typical sexual adult *Tyroglyphus* assumed, and so the foundation of a new colony is established. Their sudden appearance in quarters previously free from the presence of cheese mites, and when there is no history of their being introduced on cheese or other mite-infested viands, finds its explanation in these considerations.

Omitting, for the present, all reference to their structural features, their wonderful successive transformations, and life history, the means for effecting their destruction, when once established in a place devoted to the storage of cheese, may be considered.

These, as are other mites, are very intolerant of sulphur, or rather of the sulphurous acid that arises from it in the process of its spontaneous oxidisation. They may be destroyed accordingly by the fumes generated by burning sulphur.

Sulphur, in the combined form of carbon-bisulphide, is also quickly fatal to them. This volatile fluid, if resorted to for the purpose now treated of, might be used in the proportion of 1 lb. to every 1,000 cubic feet of space, being exposed in open vessels, which, having in view the high density of the vapour, should be placed as near the ceiling of the cheese-room as possible. By reason of the inflammability of this, also, no lights or burning tobacco should be present to ignite and explode it, much less be brought near the exposed bisulphide itself. One or two hours' use of this in a closed space would probably be found to be efficacious.

The objection that the vapour of bisulphide of carbon might taint the cheese if absorbed by it, especially seeing that it would be difficult to obtain the liquid free from volatile impurities, is one that there are grounds for concluding is not sufficient to obviate its employment.

Hydrocyanic acid gas, used subject to the safeguards regulating its administration, might be substituted for the last-named re-agent, but then its efficacy for mite destruction is not so pronounced as it is.

If cheeses and the shelves on which they are stored be dusted with flour of sulphur, this will have the effect of, in great measure, destroying mites, as it will prevent also their numerical increase by natural development

Vegetable Pathology.

GREEN SORGHUM POISONING.

Sorghum has been grown for a long series of years in this State for fodder purposes, and frequent deaths occurred amongst dairy stock—deaths which were always attributed to "hoven." It is only comparatively recently that scientific men have closely investigated the cause of the mortality due to feeding sorghum to stock. The question was brought before the Department of Agriculture in August, 1902, by Mr. Henry Tryon, Entomologist and Vegetable Pathologist to the Department, who then stated that it had recently been discovered, on the part of the Scientific Department of the Imperial Institute, that the plant in question during a certain period of its growth naturally contains prussic acid (hydrocyanic acid). Mr. Tryon subsequently forwarded to the Under Secretary for Agriculture a highly interesting authentic record of the discovery alluded to, extracted from the proceedings of the Royal Society of London, published in June, 1902. The record, which we published in this *Journal* in October, 1902, is a *résumé* of a paper by Mr. Wyndham R. Dunstan, M.A., F.R.S., Director of the Scientific Department of the Imperial Institute, and Dr. T. A. Henry, D.Sc., London, entitled "Cyanogenesis in Plants, Part II.—The Great Millet, *Sorghum vulgare*."

In connection with this publication, we now give our readers further confirmation of the discovery by the abovenamed pathologists in the fuller text thereof, for which we are indebted to the *West Indian Bulletin*.

This question of the presence of hydrocyanic acid in sorghums, millets, amber cane, Kafir corn, maize, &c., is being investigated by Dr. W. Maxwell, Director of the Queensland Sugar Bureau, and he has proved incontestably that all these contain the poison from the earliest stages up to the ripening of the seed:—

"In a previous paper, our first communication on this subject (*Phil. Trans.* B. Vol. 194, 1901, p. 515), we have shown that the poisonous effects produced by the young plants of *Lotus arabicus* are due to prussic acid which is not present in the plant as such, but originates in the hydrolytic action of an enzyme, lotasse, on a glucoside lotusin. Recently we have examined a large number of plants which, like this Egyptian vetch, appear, under certain conditions, to possess poisonous properties, and at other times to be innocuous and often valuable as fodder plants or food stuffs, with the view of ascertaining to what extent they contain glucosides furnishing prussic acid.

"Among the first of these plants we examined was the Great Millet, *Sorghum vulgare*, a plant widely cultivated in tropical countries for the sake of its nutritious grain, which in many districts of India is the staple food, known as 'Juar,' of the natives. In the West Indies what is apparently the same plant yields the important 'Guinea corn' and in South Africa 'Kafir corn.'

"We were informed by Mr. E. A. Floyer, of Cairo, that in Egypt it is well known to the Arabs that the green portions of the young plant, the vernacular name of which is 'Dhurra shirshabi,' are poisonous, and that during this period the plantations are protected in various ways in order to prevent cattle from feeding on the immature growth. It is to be noted that in Egypt the name 'dhurra' is also applied to a variety of maize which is largely cultivated.

"Mr. Floyer has given us the following account of the plant in Egypt. 'Dhurra shirshabi' is not grown in Egypt as a crop, the yield of corn being too small. It is planted chiefly in order to shade the *Arachis* (ground-nut), to which it also affords protection in forming a poisonous hedge. The 'thinnings' of the young millet are often strewn around a cultivated crop, and the neighbours are warned to keep their cattle off. The poison is most intense when young plants, 1 foot high or less, are kept without water for a long time, and such unwatered young plants are highly toxic to cows. The plant appears to have been brought to Egypt from Syria, and is now grown chiefly at Bir Abu Bala, near Ismailia. The 'fellaheen' do not plant it.

"Cases of poisoning by young sorghum have been also recorded in America and in Australia, where the plant is grown for forage purposes.

"In India the poisonous properties of the plant which bears the vernacular name 'juar' or 'jowar' do not appear to be so generally known, although several well-authenticated cases of the poisoning of cattle by it, especially during drought, have been recorded, and much has been written on the subject by veterinary surgeons and others, who have, as a rule, assumed that the toxicity is due to the presence of a poisonous fungus or insect upon the plant, or that the Great Millet is not naturally poisonous, and that the deaths of cattle as the result of eating it are due to immoderate consumption, which causes a kind of suffocation from indigestion, technically known as 'hoven.' The symptoms of 'hoven' are not unlike those of prussic acid poisoning, and it is possible that the various leguminous fodders which are known to be particularly liable to produce these effects may, at any rate in some cases, prove, like *Lotus arabicus*, and, as will be shown in the present paper, *Sorghum vulgare*, to furnish prussic acid.

"For the material we have employed in the course of this investigation we are indebted to Mr. E. A. Floyer, who was good enough to undertake its collection in Egypt at different stages of growth.

"Considerable confusion exists as to the identity of the 'great millets' grown in different tropical countries. Thus in India the plant is cultivated both as a spring and an autumn crop. The varieties ripening in the spring are probably originally derived from *Sorghum halapense*, a species indigenous to India, whilst the autumn crops are generally referred to *Sorghum vulgare*, yet both spring and autumn crops are called 'juar' or 'jowar,' and are used by the natives indiscriminately. Again, in India a plant with an inflorescence more branched than that of *Sorghum vulgare* has been regarded as a distinct species, and named *Sorghum saccharatum*; this name is, however, given in the *Index Kewensis* as a synonym for *Sorghum vulgare*, of which the plant is probably merely a variety.*

"The plant we have examined has been identified for us by Dr. Schweinfurth as undoubtedly true *S. vulgare*.

PRELIMINARY EXPERIMENTS.

"It was observed that the young plant when crushed and moistened with cold water soon acquired a strong odour of hydrocyanic acid. The production of this acid was confirmed by pressing out a little of the liquid from the moist plant, and distilling it, when a liquid was obtained which gave the characteristic reactions of hydrogen cyanide.

"A few grammes of the plant were next exhausted by hot methylated alcohol in a Soxhlet extractor. The solvent was distilled from the solution and the residue boiled with water until nothing more dissolved. The aqueous liquid was then distilled at first alone, and afterwards with the addition of dilute hydrochloric acid; in the former case none, but in the second, where hydrolysis had occurred, considerable quantities of hydrocyanic acid were found in the distillate.

"These observations led us to conclude that *Sorghum vulgare* contains a glucoside, which, under the influence of some hydrolytic agent simultaneously present, undergoes hydrolysis, furnishing as one product hydrocyanic acid, to which the observed toxicity of the young plants must be ascribed.

"A determination of the amount of acid which the air-dried plant is capable of producing at different stages of growth was made by leaving a weighted

* We hope to publish shortly a revision of the nomenclature of the *Sorghums*.—Ed. *W. I. B.*

quantity in contact with water for twelve hours, and distilling off the acid formed in a slow current of steam, the liquid being titrated by Liebig's method.

"The following results were obtained:—

(*a*) From bright green plants, about 12 inches in height, 20 grammes gave a distillate requiring 7.45 cubic centims. $\frac{N}{10}$ silver nitrate, equivalent to .201 per cent. HCN.

20 grammes gave a distillate requiring 7.8 cubic centims. $\frac{N}{10}$ silver nitrate, equivalent to .216 per cent. HCN.

(*b*) From plants, about 3 feet high, yellowish-green, and ripe; 20 grammes of these mature plants gave no indication of prussic acid, and larger quantities on distillation with water gave amounts too small to be satisfactorily estimated. No prussic acid was obtained from the seeds of the millet.

"It has been asserted by Greshoff and Treub that in many tropical plants hydrocyanic acid occurs as such—that is, in the free state. The existence of the free acid was demonstrated by these observers by immersing a thin section of the plant, first in alkali, then in a mixture of ferrous and ferric chlorides, and, finally, in strong hydrochloric acid. If the plant tissue was stained blue, it was concluded that prussic acid in the free state was present. This test, however, appears to us to be quite inconclusive, as the mere moistening of plant tissue containing both a glucoside capable of furnishing prussic acid on hydrolysis and a hydrolytic enzyme leads to the immediate production of free acid, which by Greshoff and Treub's method would be regarded as occurring pre-formed in the plant. We have carefully examined various specimens of dhurra for free prussic acid by the following methods:—

"About 20 grammes of the finely-powdered plant were placed in a distilling flask, attached by its branch tube to a long condenser. Into the closed flask a rapid current of steam was passed, which served the double purpose of immediately destroying any enzyme, and of carrying through the condenser any volatile product present in the plant. In the distillate of the plant thus obtained we never found prussic acid, either with young *Sorghum vulgare*, or *Lotus arabicus*.

"It therefore appears that, like *Lotus arabicus*, the poisonous effects of the young dhurra are due to the presence of a glucoside, which yields prussic acid under the influence of an enzyme also present in the plant.

EXTRACTION OF THE GLUCOSIDE (DHURRIN).

"The finely-powdered plant was extracted with alcohol, the solvent distilled off, and the residue warmed with water until nothing more dissolved.

"To this liquid aqueous lead acetate was added so long as a precipitate formed. The precipitate (lead tannate, &c.) was removed. The filtrate, which was now bright yellow, was treated with sulphureted hydrogen, care being taken to avoid a large excess, and the lead sulphide was removed by filtration. A stream of air was then drawn through the liquid to remove hydrogen sulphide, and the solution evaporated in a vacuum. After several weeks the syrup deposited a small quantity of a crystalline substance, and more was obtained by adding small quantities of alcohol and dissolving the mixture of precipitated sugar and glucoside in a little water, and setting aside to crystallise as before. This process was very tedious, and the two following methods have been since found to yield the glucoside much more rapidly:—

"1. The liquid, after the hydrogen sulphide treatment, is evaporated in a vacuum to a convenient volume, and the amount of free sugar determined with Fehling's solution. A little more than the calculated quantityof phenylhydrazine necessary to convert this amount of sugar into the osazone is then added, and the mixture heated for 30 minutes at 100 degrees C., filtered, and the filtrate shaken with either to remove any excess of phenylhydrazine. On evaporation in a vacuum the residue generally solidified to a mass of crystals, which were easily purified by recrystallisation from alcohol. The method always involves the loss of some of the glucoside, and cannot be employed in the isolation of small quantities.

"2. The second method, which is the more effective, consists in evaporating in a vacuum the extract left after the lead acetate and hydrogen sulphide treatment with sufficient purified animal charcoal to convert the whole into a powder, which is then exposed in a vacuous desiccator until quite dry, when it is extracted in a Soxhlet apparatus with dry acetic ether. This solvent slowly removes the glucosides, leaving behind nearly all dextrose and brown extractive matter. On distilling off the solvent a syrupy residue is left, which, if necessary, is again treated in the same manner; usually, however, it crystallises after standing in a vacuum over sulphuric acid for a few days. The substances may be recrystallised from hot alcohol or boiling water.

"The glucoside crystallises from water in brilliant leaflets, and from alcohol in small, transparent, rectangular prisms. It has no definite melting point, becoming brown when heated much beyond 100 degrees, decomposing completely at 200 degrees. It is easily soluble in hot alcohol, hot acetic, ether, and boiling water, separating in crystals on cooling. It is, however, retained in solution by aqueous solutions of dextrose, a peculiarity which accounts for the great difficulty we at first experienced in isolating it from the plant.

"It appears to contain water of crystallisation, since it loses weight when heated for some time in a water oven, but the amount cannot be accurately determined owing to the decomposition which occurs when the substance is heated near 100 degrees.

"Some trouble was met with in obtaining the material in a satisfactory state for analysis owing to the difficulty of removing the water for crystallisation without causing decomposition.

"The following combustions were made:—

"1. Material recrystallised from alcohol and dried until of constant weight in a vacuous desiccator over sulphuric acid—

.0961 gramme gave	.1817	gramme	CO_2	C	53.6	per cent.
	.0572	,,	H_2O	H	6.5	,,
.1385 ,, ,,	.2698	,,	CO_2	C	53.1	,,
	.0885	,,	H_2O	H	7.07	,,

"2. Material recrystallised from water and dried at the ordinary atmosphere temperature on filter paper—

.1260 gramme gave	.2323	gramme	CO_2	C	50.29	per cent.
	.0736	,,	H_2O	H	6.42	,,

"3. Material recrystallised from alcohol and dried in a current of warm air at 80 degrees to 90 degrees C.—

.1021 gramme gave .2051 gramme	CO_2	C	54.7				per cent.
.0452 ,,	H_2O	H	4.9				,,
$C_{14}H_{16}O_7N.\ C_2H_5OH$ requires	C	53.7	H	6.44			,,
$C_{14}H_{17}O_7N.\ H_2O$,,	C	51.1	H	5.8			,,
$C_{14}H_{17}O_7N$,,	C	54.0	H	5.5			,,
$C_{20}H_{27}O_{12}N$,,	C	50.74	H	5.7			,,

"The glucoside therefore has the composition represented by the formula $C_{14}\ H_{17}\ O_7\ N$, but when crystallised from alcohol or water the crystals which separate contain one molecular proportion of these solvents.

"For the glucoside thus isolated from Egyptian dhurra we propose the name *dhurrin*.

"*Hydrolysis of dhurrin by acids. Formation of prussic acid, &c.*

"When an aqueous solution of dhurrin is warmed on the waterbath with dilute hydrochloric acid, hydrocyanic acid is almost immediately evolved. If the heating is continued for some time, the liquid becomes considerably discoloured owing to the further action of the acid upon the products of hydrolysis. In addition to prussic acid, a sugar and a substance soluble in ether are produced. . . .

THE ENZYME OF SORGHUM VULGARE.

"In the introduction to this paper attention has been drawn to the fact that the plant when moistened with cold water evolves hydrocyanic acid, whilst it no longer does so after exposure to a temperature of 100 degrees, nor is the acid formed when the plant is placed in boiling water. These results point to the presence in the plant of an enzyme, destroyed by heat, which has the power of hydrolysing dhurrin. This enzyme was isolated by extracting the finely-ground plant with cold water, and evaporating the extract so obtained in a vacuous desiccator over quicklime to remove as much hydrocyanic acid as possible. The activity of this extract was then tested by the addition of small quantities to solutions of amygdalin, salicin, and dhurrin, these experiments being controlled by the addition of boiled and filtered dhurra extract to similar solutions of these glucosides.

"In all three cases the glucoside was quickly hydrolysed, the formation of benzaldehyde, saligenin, and parahydroxybenzaldehyde respectively being recognised by the usual tests for these substances. Comparative experiments, in which the action of an extract of sweet almonds was tried side by side with the dhurra enzyme on the same glucosides, showed that the two extracts behaved in precisely the same way. Similar preparations made by precipitating aqueous extracts of sweet almonds and dhurra with alcohol, and by precipitating calcium phosphate in such extracts, showed no difference of activity in effecting the hydrolysis of salicin. The glucosidolytic enzyme of *Sorghum vulgare* therefore performs the same functions as the enzyme emulsion which occurs in sweet almonds, and in the present state of our knowledge of the chemistry of enzymes the two substances may provisionally be regarded as identical.

THE CYANOGENETIC CONSTITUENTS OF PLANTS.

"Besides lotusin and dhurrin, the glucosides we have isolated from young plants of *Lotus arabicus* and *Sorghum vulgare* respectively, only one other cyogenetic glucoside is definitely known—that is, the amygdalin derived from bitter almonds, which, however, is found in the seeds of the plant.

"The results of our investigations have rendered it probable that the production of prussic acid in a number of other plants may be associated with the presence of cyanogenetic glucosides. Moreover, the question of the occurrence of prussic acid, and the part played by it in vegetable metabolism, involves problems of the first importance in vegetable physiology, with which we intend to deal when we have obtained a further insight into the nature of other cyanogenetic glucosides now under investigation. So far as *Lotus arabicus* and *Sorghum vulgare* are concerned, it would appear that the existence of a cyanogenetic glucoside in the young plant up to the period when the seeds ripen at any rate may serve as an important protection to the plant from the attacks of animals. It appears that animals indigenous to the countries in which these plants are native refuse to eat them in the earlier and poisonous stages of growth. The part played by the glucoside in the general metabolism of these plants, and the origin and fate of the cyanogenetic group, still remain to be ascertained. The temporary presence in a plant of a considerable quantity of a cyanogenetic glucoside, together with an enzyme capable of decomposing it, appears to us to be a fact which must have an important biological meaning.

"As so much interest attaches to the subject from several points of view, we are engaged in investigating the constituents of other plants which furnish prussic acid. Among them we may mention *Phaseolus lunatus* (seeds), *Lotus australis*, *Manihot utilissima*, and *Linum usitatissimum*, as well as a number of little known plants, derived from the colonies, which have proved to be poisonous to cattle, some of which may contain cyanogenetic glucosides. From the chemical point of view it is important, in the first instance, to isolate these glucosides and to ascertain their properties, composition, and molecular structure. This work we have now accomplished with the glucosides of *Lotus arabicus* and *Sorghum vulgare*, which are shown to be radically different in chemical constitution, whilst each belongs to a type chemically distinct from that of amygdalin, the only naturally occurring cyanogenetic glucoside hitherto definitely known."

Animal Pathology.

MEAT AS A SOURCE OF TUBERCULOSIS.

Professor Koch has declared that bovine tuberculosis cannot be communicated to man by the eating of the meat of infected animals. The question has not, however, been decided to the satisfaction of the great majority of inquirers, and until the results of a Royal Commission which is now labouring on the subject are made known. Even then there must still be room for grave doubt, because, whilst the lower animals are being experimented on it is not permissible to experiment on man. At the same time, exhaustive inquiry and experiments are being made in Germany, France, America, and other countries. It is, we believe, agreed that bovine tuberculosis can be communicated to other susceptible animals—why not then to man? Indeed, there are instances in which it has been practically demonstrated that the disease has been contracted by man through the agency of diseased meat. On this subject, the *Weekly Irish Times* says:—

When an animal suffers from acute tuberculosis the whole tissues of the body are liable to be infected, and therefore they are all unsafe if eaten raw. This is even more pronounced in localised disease in so far as the local diseased parts are concerned. But when it is localised it has been found possible to remove the diseased parts with clean knives and leave the carcass almost completely safe. Thorough cooking of the meat renders it innocuous, but it is difficult to raise the central parts of a joint to the temperature which kills the bacilli. The joint, then, which is most unsafe, provided careful cooking is carried out, is one with tubercular material in the heart of it, and, as a matter of fact, this is not likely to occur unless in "rolls" made from animals with tuberculosis of the pleura and peritoneum, since it is just this part which is usually put into the inner part of the "roll."

If diseased meat is to be used, all the diseased parts should be carefully removed by a properly trained official, who should use a clean knife, and cut freely clear of the infected part. If he were to cut through a tubercular nodule his knife would become smeared with the material, and, on proceeding further with his cuts he would smear the carcass with disease-laden material, and, instead of preventing, would be the means of spreading the disease.

It is hoped that within the next year or two there will be sufficient evidence accumulated to put the matter beyond doubt.

Agricultural Patents.

PATENTS ACCEPTED.

7000: Bickford and Huffman Company, of Macedon, New York, U. S. America (assignees of James Samuel Heath and Ernest Baseman, both of Macedon, U. S. America). "Furrow Opener for Seeding Machines." Dated 5th December, 1902.

7007: Stephen Henry Manners, of No. 164 Parade, Norwood, South Australia, Australia, agricultural engineer. "An Improved Stump and Root Grubbing Machine." Dated 9th December, 1902.

7243: Carl Christian Leopold Gether Budde, of 87 G1 Kongevej, Copenhagen, Denmark, engineer. "An Improved Method of Sterilizing Articles of Food." Dated 1st May, 1903.

Statistics.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE TOTAL RAINFALL FOR EACH MONTH OF THE YEAR IN THE AGRICULTURAL DISTRICTS OF QUEENSLAND.

STATIONS.	1902.								1903.				
	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April.	May.
North.													
Bowen	Nil.	0·44	0·11	0·02	Nil.	0·06	0·06	3·16	1·66	7·65	16·44	1·44	2·04
Cairns	2·34	4·97	3·87	0·95	Nil.	0·16	1·38	5·15	21·32	10·28	32·51	15·50	1·67
Geraldton	5·39	8·10	7·32	1·77	Nil.	0·29	0·44	5·53	38·94	17·24	45·00	14·03	7·46
Herberton	1·07	1·58	2·05	0·08	Nil.	0·93	1·13	7·02	6·88	3·69	20·80	12·04	0·64
Hughenden	Nil.	Nil.	Nil.	Nil.	Nil.	0·05	0·22	2·77	1·52	0·99	0·95	0·81	1·73
Kamerunga	2·63	5·12	4·00	0·81	Nil.	0·29	1·57	3·79	20·36	10·82	37·45	19·32	2·14
Longreach	0·03	Nil.	Nil.	0·05	Nil.	Nil.	1·27	1·56	1·81	0·09	3·48	Nil.	3·51
Lucinda	*	0·63	0·21	0·45	Nil.	0·22	0·10	2·47	17·43	11·66	44·24	6·44	6·36
Mackay	1·26	2·33	0·59	0·80	Nil.	0·17	0·35	7·71	10·45	6·47	13·51	1·50	6·75
Rockhampton	Nil.	Nil.	Nil.	0·09	1·41	0·05	0·51	5·60	0·92	1·68	3·73	1·12	6·93
Townsville	0·04	0·10	Nil.	0·10	Nil.	0·29	0·08	6·50	4·66	8·11	19·80	1·61	2·08
South.													
Barcaldine	Nil.	Nil.	Nil.	0·08	0·02	0·21	0·95	6·41	3·73	0·40	0·94	Nil.	4·92
Beenleigh	Nil.	0·11	0·62	0·49	0·28	2·92	3·36	1·83	1·88	4·77	6·49	1·90	12·40
Biggenden	Nil.	0·04	0·08	0·04	1·58	2·34	0·25	8·98	2·25	3·15	3·95	0·16	1·28
Blackall	Nil.	0·01	0·01	0·21	0·27	0·12	1·05	4 61	3·04	1·50	3·87	Nil.	5·19
Brisbane	0·47	0·06	0·55	0·98	1·30	3·42	2·59	1·82	1·31	5·35	4·79	1·33	11·82
Bundaberg	0·02	Nil.	0·07	0·13	0·31	1·24	0·65	1·38	0·97	2·60	6·05	0·38	11·55
Caboolture	Nil.	0·03	0·20	0·05	1·09	2·30	3·17	1·74	5·15	3·42	9·59	1·39	16·14
Charleville	Nil.	0·12	Nil.	1·04	0·30	1·05	2·14	4·79	1·70	0·43	2·94	1·06	2·94
Dalby	Nil.	0·15	Nil.	0·41	0·70	3·14	2·79	3·29	1·28	1·22	4·89	1·33	6·00
Emerald	Nil.	0·01	Nil.	Nil.	0·02	0·01	1·58	8·42	2·30	2·49	1·48	0·26	3·43
Esk	Nil.	0·04	0·25	0·15	0·64	0·93	4·00	7·67	1·32	3·51	4·46	1·25	9·27
Gatton College ...	0·04	0·03	0·04	0·64	0·73	2·41	3·72	5·14	3·68	3·81	2·60	0·79	7·55
Gayndah	0·29	Nil.	Nil.	0·05	0·64	2·10	2·08	3·37	0·77	2·08	2·30	0·09	6·03
Gindie	Nil.	Nil.	Nil.	Nil.	0·10	Nil.	1·65	7·14	1·43	3·15	0·49	0·19	3·31
Goondiwindi	0·02	0·41	Nil.	1·19	0·21	1·50	0·89	2·21	1·84	0·72	4·40	1·73	5·07
Gympie	0·23	Nil.	0·36	0·94	1·38	3·80	1·40	4·32	2·40	3·27	5·96	1·28	10·20
Ipswich	0·02	0·15	0·31	0·77	0·30	2·86	3·45	1·84	1·36	5·55	3·79	2·24	9·56
Laidley	0·20	0·06	Nil.	0·40	0·89	2·21	3·27	5·13	0·71	3·63	2·63	0·95	8·20
Maryborough	0·36	0·24	0·29	0·57	0·69	0·91	1·11	4·02	2·09	2·76	3·23	0·66	9·58
Nambour	0·26	0·04	*	0·70	0·35	1·26	1·66	2·64	2·53	5·03	5·18	0·83	19·46
Nerang	0·35	0·52	1·07	1·22	1·17	3·15	1·75	1·73	3·36	4·73	4·84	3·04	15·75
Roma	Nil.	0·20	Nil.	0·46	0·35	0·92	0·86	2·35	0·75	0·15	2·48	0·39	3·17
Stanthorpe	0·87	0·78	0·15	0·94	0·95	2·29	3·98	1·75	0·23	1·59	0·95	1·18	6·87
Tambo	Nil.	0·01	Nil.	0·28	0·06	0·41	1·34	4·14	2·43	0·15	4·73	0·02	1·96
Taroom	Nil.	Nil.	Nil.	0·17	0·45	0·68	1·40	2·88	4·32	1·53	1·29	0·82	8·83
Tewantin	0·80	0·91	0·91	0·85	0·87	1·94	1·96	1·35	1·90	5·30	11·52	1·80	20·22
Texas	Nil.	0·88	Nil.	1·57	0·13	2·42	1·67	1·42	0·18	0·94	0·48	1·84	4·34
Toowoomba	0·03	0·38	0·19	0·56	0·37	3·07	3·18	6·99	2·21	3·42	3·60	1·27	7·94
Warwick	0·15	0·63	0·20	0·94	0·43	2·96	2·87	4·61	0·68	2·59	2·13	0·73	8·62
Westbrook	Nil.	0·28	0·06	0·29	0·38	3·20	3·34	3·37	4·21	2·70	1·52	0·34	4·23

CLEMENT L. WRAGGE,
Wragge's Weather Bureau.

PRICES IN BRITISH MARKETS OF ARTICLES WHICH CAN BE PRODUCED IN QUEENSLAND.

BUTTER.—Australian, choicest, 96s. to 100s.; second quality, 96s. per cwt.; brisk sale. Danish, 100s. to 102s.; Canadian, 80s. to 92s.; New Zealand, 97s. to 98s.

CHEESE.—American, 63s. to 68s.; Canadian, 65s. to 69s.; New Zealand, 66s. to 67s. per cwt.

CONDENSED MILK.—18s. 6d. to 20s. 6d. per case, in 20-case lots.

SUGAR (duties, raw 2s. to 3s. 10d. per cwt.).—Refined, £15 to £15 5s. per ton; raw, £13 to £14; German beet, 88 per cent., 8s. $4\frac{1}{4}$d. per cwt.

MOLASSES (duty, 2s. per cwt. and ¼ per cent.).—3s. 6d. to 5s. per cwt.

RICE (duty, 5d. per lb.).—Rangoon, £8 to £15 per ton; Japan, £13 to £16; Java, fine to finest, £20 to £25; Patna, fine, £18 to £22 per ton.

COFFEE (in bond, duty 1½d. per lb. and ¼ per cent.).—Ceylon plantation, 40s. to 96s. per cwt.; smalls, 58s.; Peaberry, 60s. to 123s.; Santos, 25s. to 50s.; Mocha, 50s. to 100s.; Jamaica, finest, 90s. to 130s. per cwt.

CHICORY ROOT, dried (duty paid).—26s. to 31s. per cwt.

ARROWROOT.—St. Vincent, 1¾d. to 4d.; Natal, 7d. to 8d.; Bermuda, 1s. 3d. to 1s. 6d.

WHEAT.—29s. to 35s. 6d. (old Dantzic) per 496 lb. (3s. 7½d. to 4s. 5¼d. per bushel). Parcels afloat, 29s.

FLOUR.—19s. 6d. to 22s. 6d. per 280 lb.

MALTING BARLEY.—English, 25s. to 30s. per 448 lb.; Californian, 28s. to 30s. per 448 lb.; grinding, 18s. to 19s. 3d. per 400 lb.

OATS.—New Zealand, 26s. to 28s. per 384 lb.; Canadian, 17s. 6d. to 18s. per 320 lb.

SPLIT PEAS.—45s. per 504 lb.

GINGER.—Cochin, small rough, 33s. per cwt.; good washed rough was bought in at 42s. to 45s.; unassorted native cut realised 55s., medium and small 60s., and bold 80s. per cwt., while the prices of Jamaica were 37s. to 37s. 6d. for ordinary dull and lean, and 41s. for middling washed. At the sale on the 11th of the month the first arrival of the new crop of Cochin was offered, but there was very little demand for it, and it was bought in at 40s. per cwt. for washed rough, while one lot of bold rough sold at 40s. per cwt. Calicut bold cut was bought in at 90s., and medium and small at 54s. At the same sale Jamaica partly sold at 36s. 6d. to 38s. for small dark lean and ordinary dull, the better qualities being bought in. The quantities put on the market at this sale were—Cochin, 580 packages; Jamaica, 95 barrels. At the last sale in the month there was very little demand for this article, and the prices stood with very little change from the previous sale, which gave bold native cut Cochin at 75s., and small at 48s.; while Jamaica was partly sold at 38s. 6d. to 39s. for dull dark, and 40s. 6d. to 42s. 6d. for dull washed. A parcel of Japan was withdrawn without a price being mentioned, but it was said to have been sold privately at 30s. per cwt.

VANILLA.—3s. to 7s. per lb.

PEPPER.—Capsicums, 20s. to 90s. per cwt.; chillies, 37s. to 55s. per cwt.

WINE.—Australian Burgundy, 13s. per dozen bottles; Waratah, 18s. per dozen; fair red Australian claret in bond, 2s. to 2s. 6d. per gallon; fine old quality, 4s. 6d. per gallon. The trade in Australian wines is not suffering the diminution observable in some of the other branches. The first seven months of the year show an increase of 5,223 gallons.

GREEN FRUIT.—Apples, Tasmanian and Australian, 10s. to 14s.; New Yorks, 15s. 6d. to 16s. per case. Market firm owing to scarcity of cherries and strawberries. Bananas, 12s. to 13s. 6d. per bunch; pineapples, 4s. to 5s. 6d. each; grapes, Almeria, 11s. 6d. to 12s. 6d.; choicest, 23s. to 25s. per barrel; oranges, Valencia, from 10s. for common to 30s. for finest selected per 420; lemons, Naples finest, 26s. to 30s. per 420.

DATES.—Tafilat, 45s. to 55s. per cwt.; Persian, 9s. 6d. to 14s. 6d. per case; Egyptian, 20s. to 35s. per cwt.

COTTON.—5½d. to 6d. per lb.

COTTON SEED.—£6 8s. 9d. per ton.

COTTON-SEED OIL CAKE (decorticated).—£6 10s. to £6 15s. per ton.

COTTON-SEED OIL.—Crude, £21 10s. per ton.

LINSEED.—39s. to 49s. per 416 lb.

Lucerne Seed.—56s. to 60s. per cwt.

Linseed Oil.—£23 15s. to £24 per ton.

Linseed Oil Cake.—£6 10s. to £6 17s. 6d. per ton.

Olive Oil.—£30 to £60 to £70 per tun (252 gallons).

Manila Hemp.—£25 to £30 per ton.

New Zealand Hemp.—£33 10s. per ton.

Sisal Hemp.—£35 per ton.

Flax.—£46 to £52 per ton.

Frozen Meat.—The following are the Frozen Meat Trade Association's Smithfield market quotations for the undermentioned classes of frozen meat, based on actual sales of not less than 100 carcasses of mutton or lamb, or 25 quarters of beef of fair average quality. These quotations are not for selected lines, but for parcels fairly representative of the bulk of the shipments now on the market:—

New Zealand Sheep.

(Crossbred Wethers and Maiden Ewes.)

	June 13.	June 20.
Canterbury, light (48 lb. to 56 lb.)	$3\frac{7}{8}$d.	$3\frac{7}{8}$d.
Canterbury, medium (56 lb. to 64 lb.)	$3\frac{3}{4}$d.	$3\frac{3}{4}$d.
Canterbury, heavy (64 lb. to 72 lb.)	$3\frac{9}{16}$d.	$3\frac{5}{8}$d.
Dunedin and Southland (56 lb. to 64 lb.)	$3\frac{1}{2}$d.	$3\frac{1}{2}$d.
North Island (55 lb. to 65 lb.) ...	$3\frac{3}{8}$d.	$3\frac{7}{16}$d.

Australian Sheep.

(Crossbred and Merino Wethers.)

Heavy (over 50 lb.)	None offering.	
Light (under 50 lb.)	None offering.	

River Plate Sheep.

(Crossbred and Merino Wethers.)

Heavy (over 50 lb.)	$3\frac{1}{16}$d.	$3\frac{1}{16}$d.
Light (under 50 lb.)	$3\frac{1}{16}$d.	$3\frac{1}{16}$d.

New Zealand Lambs.

Canterbury, light (28 lb. to 36 lb.)	5d.	$5\frac{5}{16}$d.
Canterbury, heavy (36 lb. to 42 lb.)	5d.	$5\frac{1}{8}$d.
Dunedin and Southland (28 lb. to 42 lb.)	$4\frac{15}{16}$d.	$5\frac{1}{16}$d.
North Island (28 lb. to 42 lb.) new season's	$4\frac{13}{16}$d.	$4\frac{15}{16}$d.

Australian Lambs.

30 lb. to 40 lb.	None offering.	

River Plate Lambs.

30 lb. to 40 lb.	None offering.	

New Zealand Frozen Beef.

Ox, fores (180 lb. to 220 lb.) ...	3d.	$2\frac{7}{8}$d.
Ox, hinds (180 lb. to 220 lb.) ...	$4\frac{3}{4}$d.	$4\frac{5}{8}$d.

Australian Frozen Beef.

Ox, fores (160 lb. to 200 lb.) ...	None offering.
Ox, hinds (160 lb. to 200 lb.) ...	None offering.

River Plate Frozen Beef.

Ox, fores (160 lb. to 220 lb.) ...	$2\frac{15}{16}$d.	$2\frac{11}{16}$d.
Ox, hinds (160 lb. to 220 lb.) ...	$4\frac{7}{16}$d.	$4\frac{3}{16}$d.

(All quotations for beef are nominal.)

EGGS.—French, 9s. 6d. to 9s. 9d.; Danish, 6s. 3d. to 8s. per 120.

BACON.—Irish, 59s. to 65s.; American, 52s. to 56s.; Canadian, 56s. to 57s. per cwt.

HAMS.—Irish, 86s. to 100s.; 46s. to 48s.; American, 56s. to 62s. per cwt.

TALLOW.—Mutton, fine, 30s. 6d.; medium, 28s. 3d. per cwt. Best beef, 31s. 9d.; medium, 28s. 9d. per cwt.

COPRA (cocoanut kernel).—£15 15s. to £16 10s. per ton; £8 to £9 per ton at the South Sea Island trading stations. Corresponding value in Queensland, £10 to £12 per ton.

COCOANUT OIL.—£35 per ton.

Times of Sunrise and Sunset, 1903.

DATE.	MAY.		JUNE.		JULY.		AUGUST.	
	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1 ...	6·16	5·14	6·33	4·58	6·43	5·0	6·33	5·14
2 ...	6·17	5·13	6·33	4·58	6·43	5·0	6·32	5·15
3 ...	6·18	5·12	6·35	4·57	6·43	5·1	6·31	5·16
4 ...	6·18	5·12	6·35	4·57	6·43	5·1	6·30	5·17
5 ...	6·19	5·11	6·36	4·57	6·43	5·1	6·30	5·18
6 ...	6·19	5·10	6·36	4·57	6·43	5·1	6·30	5·18
7 ...	6·20	5·9	6·36	4·57	6·43	5·1	6·28	5·19
8 ...	6·21	5·8	6·37	4·57	6·43	5·2	6·27	5·19
9 ...	6·21	5·6	6·37	4·57	6·43	5·2	6·27	5·19
10 ...	6·22	5·6	6·38	4·57	6·43	5·3	6·26	5·20
11 ...	6·22	5·6	6·38	4·57	6·43	5·3	6·25	5·20
12 ...	6·23	5·5	6·38	4·57	6·43	5·4	6·24	5·21
13 ...	6·24	5·5	6·39	4·57	6·42	5·4	6·23	5·22
14 ...	6·25	5·4	6·39	4·57	6·41	5·5	6·23	5·23
15 ...	6·25	5·3	6·39	4·57	6·41	5·7	6·21	5·23
16 ...	6·25	5·3	6·39	4·57	6·41	5·7	6·21	5·23
17 ...	6·25	5·3	6·39	4·57	6·41	5·7	6·21	5·23
18 ...	6·26	5·2	6·40	4·58	6·41	5·7	6·20	5·24
19 ...	6·26	5·2	6·40	4·58	6·41	5·7	6·20	5·24
20 ...	6·27	5·1	6·41	4·58	6·40	5·8	6·18	5·24
21 ...	6·27	5·1	6·41	4·58	6·40	5·8	6·17	5·25
22 ...	6·27	5·1	6·41	4·58	6·39	5·9	6·16	5·26
23 ...	6.29	5·1	6·42	4·58	6·38	5·10	6·15	5·27
24 ...	6·29	5·1	6·42	4·58	6·38	5·10	6·14	5·27
25 ...	6·30	5·0	6·42	4·58	6·37	5·11	6·13	5·27
26 ...	6·30	5·0	6·42	4·58	6·37	5·11	6·13	5·27
27 ...	6·30	5·0	6·42	4·58	6·37	5·11	6·12	5·28
28 ...	6·31	4·59	6·43	4·59	6·36	5·12	6·11	5·30
29 ...	6·31	4·59	6·43	4·59	6·36	5·12	6·10	5·30
30 ...	6·32	4·58	6·43	5·0	6·35	5·13	6·7	5·31
31 ...	6·32	4·58	...	...	6·34	5·14	6·6	5·31

PHASES OF THE MOON.

			H.	M.
4 May	☽	First Quarter	5	26
11 ,,	○	Full Moon	11	18
19 ,,	☾	Last Quarter	1	18
27 ,,	●	New Moon	8	50
1 ,,		Perigee	3	0
2 June	☽	First Quarter	11	24
10 ,,	○	Full Moon	1	8
18 ,,	☾	Last Quarter	4	44
25 ,,	●	New Moon	4	11
2 July	☽	First Quarter	7	2
10 ,,	○	Full Moon	3	43
18 ,,	☾	Last Quarter	5	24
24 ,,	●	New Moon	10	46
31 ,,	☽	First Quarter	5	15
8 Aug.	○	Full Moon	6	54
16 ,,	☾	Last Quarter	3	22
23 ,,	●	New Moon	5	51
30 ,,	☽	First Quarter	6	34

General Notes.

LIME FOR TOMATOES.

A few months ago we planted out a number of tomato plants. A little while previously a few pounds of lime, which had been slaked for egg-preserving purposes, were scattered on a portion of the tomato ground. Where the plants were placed on this heavily limed soil, they are to-day 2 feet higher, much stronger, and are bearing more fruit than those which had no access to lime.

TREATING TOMATO PLANTS.

We have already described several methods of planting out tomato plants. Here is another, for which certain success is claimed. Sow the seed in a seed-bed. Do not lift them for transplanting until they are large and strong. Before planting out, clip all the leaves off except the top bud. The plants so treated will start to grow immediately, because they are not obliged to expend their energy in trying to revive the dying leaves. The plants will bear a month earlier.

A HINT FOR FISHERMEN.

Dutch fishermen make astonishing catches by means of a very simple expedient. They put a number of live worms and insects into a bottle partly filled with water, which is then securely corked. The bottle is dropped into the water, and the fisherman sinks his line alongside. It appears that the wriggling contents of the bottle so tempt the fish that they fall easy victims to the baited hooks.

TEACH YOUR DAUGHTERS TO COOK.

Teach your daughters to cook: that should be the first care of every mother as soon as her girls reach the age of twelve years. It does not matter if they may count on an income of \$2,500 or \$250 each per annum, whether they are fine ladies or poor working girls; they should know that the woman who cannot cook and serve an appetising meal without wasting good food is a disgrace to her sex.

It is true that the rich woman need not go into her kitchen and soil her fingers in doing what she can pay servants to do for her. None the less she should be able to criticise their efforts and supervise the household expenditure, so that a perfect knowledge of the art of cooking is as necessary to her as it is to the labourer's wife who has to make one shilling do the work of two, and yet feed the family well. The young bride who, suddenly finding herself without a servant, discovered that she could not even boil a potato, is a very good example of the useless sort of woman who should not marry until she has qualified herself at the cooking school.—*Health Journal.*

SCHOOL TEACHERS IN MEXICO.

In Mexico the school teachers have a highly comic and original method of rewarding their pupils. If a boy has worked well he is given permission to light a cigar during the lesson. If it should happen that the whole class has been very industrious, this kind and unusual privilege is given to all the boys. Of course the master sets his pupils a good example, and the size and quality of his cigar announce to all that he is supreme in this kingdom. Then he has another privilege that his pupils do not share with him. He has a jug beside him filled with a delicious drink, and the parents of his pupils often fight for the honour of being allowed to fill it.—*Süd Deutsche Tabak Zeitung.*

SMUGGLED IN HAY.

While unloading baled hay at Hull, from Rotterdam, one of the bales burst while suspended, and about 1,000 cigars fell upon the workmen. It is supposed smuggling in this manner has been going on for some time.—*Western Tobacco Journal.*

GREEN TOMATO PICKLE.

A good recipe for pickling green tomatoes appears in the *Garden and Field*:—

Slice 1 gallon of green tomatoes, sprinkle salt between each layer, let stand twelve hours, and drain. Add a little cayenne pepper and three onions sliced. Now take two quarts of good vinegar, ½-lb. brown sugar, two tablespoonfuls of mustard, and a heaped teaspoonful of cloves. Heat it until it begins to boil, and then add one teaspoonful of curry powder. As soon as the vinegar reaches the boiling point put in the tomatoes and onions, and boil for twenty minutes.

Why should we always have to go abroad for our recipes for such articles as jams and pickles, when at every exhibition at Bowen Park, at every small country show, the most exquisite jams, pickles, &c., are exhibited, all made by farmers' wives in almost every district in Queensland? In Europe and in the United States, those who know how to prepare these delicacies invariably give their knowledge to the world. Here the art is carefully guarded, and no one is a bit the wiser from seeing the articles exhibited, and the makers thereof are probably not so well known in the market as they would be if they advertised their wares by describing the process of manufacture. Nothing is gained by hiding one's light under a bushel.

VALUE OF ONIONS.

A contemporary writer on onions describes them as being a valuable medicine in many diseases. They will, he says, serve (being eaten raw) to keep off disease if used as here stated:—

To cure spasms rub them on the spine, to cure typhoid fever bruise with a hammer and bind on the feet, to cure chills bind round waist and to the pulse, for diphtheria bind to the throat, for a burn wet with raw juice, to cure a cold boil and eat with butter, for croupy babies slice and sprinkle with butter and cover closely, and when the juice runs out give a spoonful every hour.

We have frequently stated that apples and lemons are better than any drugs to cure or ward off many of the ailments flesh is heir to. We know of a case in which a Government agent of one of the South Sea Island labour vessels completely cured himself of what the doctors said was chronic, incurable rheumatism, by taking nothing liquid but pure or diluted limejuice squeezed from fresh limes. In six months, during which time he was exposed to constant rain and salt water wetting, the rheumatism entirely disappeared. These three remedies, to which may be added celery, will entirely dispel the acids which give rise to rheumatic affections. They are simple, cheap, and effective, pleasant to take, and, what is certain, they effect a cure if persevered in.

TO CURE EGG-EATING DOGS.

Some time ago, in reply to a correspondent, we suggested blowing the hen's egg and filling it with ammonia, then sealing it up. That is an excellent cure, but perhaps a better one is that suggested by a correspondent of the *Agricultural Journal* of the Cape of Good Hope. He says the best cure he has found is to dissolve a little caustic soda in water and put the nest eggs into the liquid. Take them out, let them dry, and put back into the nests. (The caustic soda will not harm the fowls.) When the dog takes any of these eggs into his mouth, he will drop them like a hot coal as soon as the moisture of his mouth begins to dissolve the caustic soda. After a few days, the dog will fight shy of all eggs. This remedy has never been known to fail.

ONIONS FOR NERVES.

There is nothing, medicinally speaking, so useful in cases of nervous prostration as the poor and humble onion (says *What to Eat*). They are almost the best nervine known, and may be used in coughs, colds, and influenza, in consumption, scurvy, and kindred diseases. White onions overcome sleeplessness, while red ones are an excellent diuretic. Eaten every day they soon have whitening effect upon the complexion.

NEW PROCESS IN OLIVE OIL MAKING.

A special correspondent of the *Californian Fruitgrower* writes·—

It seems as if the pressing of olives for oil would soon be a thing of the past, and that a method which, with variations, for centuries has been in operation must at last give way to a later and better way. A new process for the extraction of oil from olives is now being tested at the University of California, at this place, and the preliminary studies on the method in the Agricultural Department lead the experts to believe that a much larger product of first-grade oil can now be secured than by the old way. The process requires a new machine to take the place of the clumsy, old-fashioned oil press. This is none other than the modern sugar-house centrifugal machine, which is used in the manufacture of beet sugar, and extracts the sugar from the molasses by forcing the pulp through a sieved vessel revolving at a high rate of speed.

The idea has been borrowed from Algeria, Africa, where the process has given splendid results, though carried out only with the crudest apparatus. Dr. George W. Shaw, Assistant Professor of Agricultural Chemistry, in charge of the beet sugar industry, has started the work at Berkeley. He has set up his machinery and commenced operation. From his preliminary experiments he feels confident that he can increase the percentage of oil that can be obtained from a given amount by at least 10 per cent.

This will mean a tremendous saving in the production of oil, which has hitherto been attended by a large and unavoidable waste. In the old method which has been in vogue for years it has been necessary after crushing the olives to submit the pulp to a powerful screw or hydraulic press in order to strain the oil. A crude wrapping of grass mats, wooden gratings, or sacking has been needed, and this has absorbed much of the product, especially as the pressing went through several stages, during which various qualities of oil were secured.

The results with the new centrifugal are far more satisfactory, both as regards simplicity and economy in manipulation and results.

STUMPING LAND.

An American plant of getting rid of stumps is worthy of a trial where circumstances permit. A hole is bored with a large auger in the stump in a diagonal direction and filled with nitrate of potash and a little water, and then plugged with clay. The following season the hole is cleaned out and filled with kerosene oil. After a day or two, fire is applied, and every root, however deep in the soil, is burnt out.

A RUSTY NAIL WOUND.

Many instances could be adduced showing the often fatal effects of a wound from a rusty nail. And still more cases have occurred of blood-poisoning and consequent loss of limbs from the same cause. Whenever a nail or a splinter has run into any part of the body, or whenever a person receives a cut or a wound from any instrument, the safest thing to do, and one which may save life or limb, is to saturate a rag with turpentine, and, after washing the wound in the same spirit, to bind it up at once. If no turpentine is to be had, smoke the wound well with burning wool or woollen cloth. Twenty minutes will allay the worst case of inflammation arising from it, and remove all pain.

A VALUABLE COW.

Mr. J. D. Rockefeller's pet Jersey cow, valued at £6,000, has been ill at Tarrytown, New York. Professor James Law, of Cornell University, was called in to attend the animal, his fee, it is stated, being £500.

QUEENSLAND NATIONAL AGRICULTURAL AND INDUSTRIAL ASSOCIATION.

We have received from the secretary of the above association a list of judges for shows compiled from the nominations of such societies within this State as replied to their invitation.

The names of the gentlemen nominated by these societies appear alphabetically in the sections in which they are willing to act, such willingness having been vouched for by the nominators.

It is hoped that this list will prove useful to all societies as a means of enabling them to readily ascertain the names of desirable judges, and thereby assist in furthering the beneficial effects of agricultural shows generally.

This list is a step in the right direction. It contains the names of gentlemen in all parts of the State competent to act as judges in every section usually represented at the exhibitions at Bowen Park, and should be of great value to exhibitors.

MARYBOROUGH CONFERENCE.

In our next issue of the *Journal* we shall publish a full report of the proceedings at the Agricultural Conference to be held at Maryborough on the 6th, 7th, 8th, and 9th July, under the presidency of the Hon. G. H. Dalrymple, Minister for Agriculture.

AGRICULTURAL AND HORTICULTURAL SHOWS.

The Editor will be glad if the secretaries of Agricultural and other Societies will, as early as possible after the fixture of their respective shows, notify him of the date, and also of any change in date which may have been decided on.

Answers to Correspondents.

SCAB IN POTATOES.

FARMER, Nambour.—We have just seen the remedy you ask for, in the *Australian Agriculturist*. We do not vouch for it of our own knowledge, but it may serve your turn:—Dissolve 2 oz. corrosive sublimate in 16 gallons of water; when fully disolved, put the seed potatoes in a bag and immerse in this mixture, not leaving them to soak, but only long enough to ensure that all the seed is thoroughly wetted. Corrosive sublimate is highly poisonous, and must be handled carefully, and should be dissolved in a wooden vessel.

CULTIVATION OF PASSION FRUIT AND CAPE GOOSEBERRIES.

SENCI (?), Bowen.—1. The passion fruit is best propagated by seeds. Any ordinary open soil with manure will grow it to perfection, although a rich, peaty soil, moist but *not wet*, would be the most suitable. Plant during spring. If run on a trellis, the plants should be from 10 to 15 feet apart; the vines do not, as a rule, require tying to the wire, as the tendrils are long, clinging, and strong. All passion vines greatly exhaust the soil, so that manuring occasionally is advisable. The plants should be treated as we treat peach-trees—*i.e.*, they should be summer pruned by nipping off the ends of the fruit-bearing laterals. They are very hardy, and require little attention. The great granadilla, which is a large species of passion fruit, may be cultivated in the same manner.

2. The Cape gooseberry grows wild in many parts of the State. Especially does it grow freely on scrub lands when a first crop of maize has been harvested. Sow in August or September in rich, warm soil. When the plants are 6 inches high, put them out to about 3 feet apart, and support them with sticks as you would peas. It is well to stop the plants, when the first fruit forms, by pinching off the ends of the shoots. Water freely. If sown in August, returns should come in about November or December. We cannot give you the yield per acre, as they are not regularly cultivated by farmers. Hundreds of cases are, however, gathered by the farmers of the Blackall Range, near Brisbane, and they fetch good prices in the Brisbane market. It would not be profitable to pay labour to gather them. This work is usualy done by the children of the family.

3. Date palm seeds and suckers may be obtained at the Acclimatisation Gardens, Brisbane, or from the farmers in the Central districts, particularly at Barcaldine, where numbers of date-trees are bearing. The cost of 100 suckers would be very trifling, but we cannot say what the cost would actually be, as we know of no sales being made.

PRICKLY-PEAR COUNTRY FOR SELECTION—DESTRUCTION OF PRICKLY PEAR.

EXPERIMENT, Nundah.—1. There are large areas of Crown lands overgrown with prickly pear adjacent to the railway in the vicinity of Chinchilla and Warra, from 180 to 205 miles from Brisbane. The law authorises the opening of prickly-pear infested land for selection in three modes, viz:—

- (*a*) As prickly-pear frontage selections, land slightly infested or entirely free from pear situated adjacent to land heavily infested.
- (*b*) As prickly-pear infested selections, land entirely or heavily infested with pear.
- (*c*) As prickly-pear (bonus) selections, land so heavily infested as to call for a bonus to induce its being selected.

None of these provisions of the law have yet been put in force to any appreciable extent, but an area near Warra is now about being laid out and classified with a view to being opened for selection. The worst will probably be offered without purchasing price and with a bonus payable in seven annual instalments as one-seventh of the land is annually cleared of pear. When during three years more the land has been kept clear a deed of grant will be issued.

The land next heavily infested will doubtless be opened as prickly-pear infested selections at low purchasing prices. Ten years without payment will be allowed for the clearing of the land proportionately each year. Then during another five years the purchasing price will be payable in five equal instalments; and then, the land having been kept clear, a deed of grant will be obtainable.

The land least infested will be open as prickly-pear frontage selections at higher purchasing prices, and on similar terms to the infested selections, except that the clearing must be done in five years instead of ten.

2. Arsenite of soda has been used most successfully by the Department of Agriculture in clearing Bunker's Hill, at Westbrook, of the pear, but the cost was found to be too great to induce the Department to advise the farmers to adopt the process.

The Rev. Maitland Wood has invented a pill and a kind of gun for introducing the pill into the plant, which completely dies out by this treatment, but it has not yet been tried, we believe, on a large scale.

TREATING CLAY SOILS.

RASOS, Bowen.—1. Clay soils require to be well drained, deeply ploughed, and subsoiled. Lime applied at the rate of from 2 to 5 tons per acre every five years, or, as is the practice of some farmers, at the rate of ½ ton annually, will render the soil warmer and easier to work. It breaks up the material containing potash, which is then presented in an available form as plant food. Long farmyard manure is also good for clay soils. A rather more expensive method of treatment is to pare the soil, pile the parings in small heaps, and burn to a ruddy brown colour; then mix this burnt soil with the land. Peas, potatoes, watermelons, &c., are injured by lime, whilst sugar-cane, maize, onions, tobacco, cabbage, rock-melons, &c., are benefited by it. If you have lighter soils, why not lay down the clay soil in pasture. Alsike or Swedish clover likes cold, stiff soils. If the soil is moist you might try *Paspalum distichum*, or swamp couch. However, without further particulars, we do not like to advise on this matter.

2. It is not the intention of the Department of Agriculture to publish "First Steps in Agriculture," by the Editor, for use in schools. Another elementary work has been adopted which is considered more suitable for the purpose.

3. There is no rough-and-ready way of determining the chief constituents of a soil or its deficiencies.

GROWING PINEAPPLES FROM SUCKERS.

HENRY, Mount Morgan.—1. In most parts of this State, planting can be carried on at any time that plants can be obtained, but planting during September and October is usually preferred, because, if there is sufficient moisture in the soil, the plants root quickly, and, as the soil and air are steadily getting warmer, there is no check in the growth, which is well maintained all through the summer, and the plants are consequently thoroughly established before winter. Some growers prefer autumn planting, because well-ripened suckers can usually be obtained then.

2. Suckers may be planted in single or double rows. In the first case, the rows are usually 9 feet apart, and the suckers are planted at distances of from 1 to 2 feet in the rows. At 1 foot apart you will require 4,840 plants to set out an acre. At 2 feet apart, only half the quantity, the rows being 9 feet apart in both cases.

In double rows, the two rows are from 18 to 20 inches apart, and the suckers in the rows 18 to 24 inches apart. The distance from double row to double row is usually 9 feet.

If you intend going in for pineapple culture, write to Mr. A. H. Benson, Department of Agriculture, for his latest articles on the industry now appearing in this *Journal*, the first having been printed in the February number.

Your letter only reached us on 3rd June, too late, of course, for reply in the issue of 1st June.

BROMUS INERMIS, SPELTZ, PATCHOULI, ETC.

BRUTUS, Bowen.—1. The grass botanically named *Bromus inermis* was some time ago introduced into the United States of America from Europe. It is of considerable promise for hay and pasture. It is strongly stoloniferous, and quickly makes a thick, firm turf. In America it has survived frost when many other grasses were killed. Its strong perennial character and its unusual drought-resisting powers should recommend it for our semi-arid districts, as it thrives well on dry, loose soil; but, of course, the better the soil the better the yield. Its nutritive value is comparatively low, and its habit of producing long, underground stolons makes it somewhat difficult to eradicate from the soil. It grows from 2 feet to 5 feet high. From the description, we should consider it to have something the same style of growth as Johnston grass.

2. Speltz is a kind of wheat (*Triticum spelta*). The varieties of this wheat are said to be hardy and prolific, and do better than other wheats on poor soils. The chaff adheres closely to the grain, and consequently does not easily thresh off. In Manitoba it produces 50 bushels from 1 bushel of seed. Some years ago the Department of Agriculture imported a little, and it was distributed to some German farmers (at Killarney, we believe). It succeeded very well, but our farmers would not benefit much by growing it for flour-making purposes, as the flour produces the black bread, almost like rye-bread, so much used in Germany and Russia. As a fodder plant and for hay-making purposes, it might be worth a trial, especially the Dinkel speltz. For an account of the grain, see Vol. IX., p. 302, of this *Journal*.

3. Patchouli roots or seed would have to be imported from India or the Straits Settlements. Many years ago the Colonial Botanist imported some, and it was grown experimentally. Some was also grown at the gardens of the Queensland Acclimatisation Society, and it was supposed to be still growing there at a late date this year.

KEEPING SWEET POTATOES.

B. F. EVANS, Leyburn.—1. The potatoes must be thoroughly ripe before putting them away. They may be known to be ripe by the milky juice which exudes from a broken potato remaining white on exposure to the air. If it turns dark, the potato is not ripe. When dug, spread the tubers out in the field or in the barn for several days, to cure. Then lay down a thick layer of sand, on which place a layer of tubers. Then pour sand over them till they are completely covered and every crevice is filled. Next, put down a second layer of tubers on top of the sand; pour in sand again as before, and continue the work till all the tubers are put away. The sand excludes the air, and the potatoes are safe, and will keep in ordinary weather right through the winter. The main points to be observed are, perfect ripeness and sufficient curing.

2. We will try and get information for you concerning agricultural motors.

SPRAYS AND SPRAY PUMPS FOR CITRUS TREES.

CITRUS, Gatton.—1. Kerosene emulsion, if properly made, will kill most, if not all, of the scale you mention, and is probably about as good as the resin mixture, but wants making carefully, and must not be allowed to run down into the roots. Wrap a strip of bagging round trunk when spraying, just at ground.

2. Climax pump—Lassetter and Co., Elizabeth street, Brisbane. Read Mr. Benson's articles, June, 1900, on citrus culture, carefully. They cover the whole ground.

TOBACCO SEED NOT GERMINATING.

PETER FAIRER, Atherton.—1. Your request for certain numbers of the *Journal* is being attended to.

2. In the matter of tobacco seed not germinating, Mr. R. S. Nevill, Instructor in Tobacco Culture, says:—There may be several reasons for this, but the most likely one is, that the seeds were covered too deep. They should not be covered at all, but the soil should be left with rake-tooth marks and dry. Then the seed should be sown, and afterwards sprinkled with a garden sprinkler, which closes the rake-tooth marks. This is sufficient covering. After sowing, the plants should have *plenty* of sunshine and warmth, too much moisture being very undesirable, as the plant, when first sprouted, is microscopic, and rots quickly if too moist. I do not think it probable that the seeds were defective.

[To this we may add, that some years ago we imported tobacco seed of several varieties from America. Some of them were sown in a box, and all germinated. Not knowing anything about tobacco-growing, we sowed the rest of the seeds in beds, as if they were cabbage seeds. That is, we covered them with a little soil. The result was that we did not raise a plant from unquestionably good seed.—Ed. *Q.A.J.*]

QUICK-GROWING HEDGE PLANT.

ORPINGTON, Merinda.—The *Duranta Plumierii*, blue-flowering, is the quickest growing hedge plant we know of. When from 6 to 8 feet high, and if kept properly trimmed, it makes an admirable shelter for poultry, and if planted from 2 to 3 feet apart forms an impenetrable fence. It grows best from rooted plants, but will also grow freely from cuttings. Plants can be obtained from all nurserymen in the State.

NON-SETTING OF DATES.

GEO. HARVEY, South Kolan.—1. Neither of your date-trees is a male plant, hence the fruit not setting, as the flowers have not been fertilised.

2. You can only tell the difference between the male and female tree by the flowers. The male produces a large quantity of pollen.

3. The climate of your district is well suited for the date palm.

RELATIVE STRENGTHS OF WOOD AND IRON.

DOOGOO, Bowen.—We have not yet got the information you require. A good book on the subject of Australian timbers and their relative strengths and uses is "Australian Timber, its strength, durability, and identification," by James Mann, Melbourne. Walker, May, and Co., Mackillop street, Melbourne, publishers. Price, 5s.

WEIGHTS OF MILK AND CREAM.

FARMER, Lowood.—Milk weighs 10 lb. 4 oz. to the gallon. Thick cream weighs from $9\frac{1}{2}$ lb. to $9\frac{3}{4}$ lb. per gallon.

POULTRY.

SUBSCRIBER.—1. If your male bird is old, three or four hens will be enough; if a young cockerel, I would recommend six or eight at least. If there be too many infertile eggs, reduce the number; if you find the eggs to be fertile but will not hatch, put in more hens.

2. It is best to separate the rooster from the hens after the breeding season is over, and especially during the moulting season; both rooster and hens will be the better for it. It is also advisable to separate young cockerels and pullets.

3. Keep your breeding birds separated until you want to breed again.

4. August and September are the best months for hatching chickens, as they will then be laying in the autumn and winter, when the old fowls are moulting.

5. Chicken-pox or warts:—Keep the chickens' blood in good order. The following is a good blood purifier:—Take fluid extract of sarsaparilla ($\frac{1}{4}$-lb.), iodide of potassium ($\frac{1}{4}$-oz.), and mix with $\frac{1}{2}$-gallon of water. Dose, half-teaspoonful for each fowl. If a number are to be treated, mix it in the pollard in the same proportions; it will be less trouble. Give this treatment about January, or just before the warts generally appear, for about a fortnight once a day. Should the warts break out, touch them with citric ointment, and leave them for about three days, after which they will dry down to a black scab and fall off.

6. Scaly legs:—Soak the legs in warm water, and then clean off all you can with a stiff tooth-brush, without making them bleed; then apply carbolic oil. Repeat the application, if necessary.

7 and 8. I cannot answer these questions.

9. The Orpingtons, Wyandottes, and Langshans are about the best winter layers, but it all depends on the strain.

10. The best food for egg-production:—Pollard in the morning, green cut bone or a little meal at mid-day, and good heavy oats or wheat at night. A little "Sunlight" oil-cake with the pollard in the morning makes a good feed. Feed just sufficiently to keep the birds in good condition, but not too fat; give them a little lettuce or cabbage every day.

HON. SECRETARY, DANDEROO PROGRESS ASSOCIATION.—"The Breeding and Treatment of Dairy Cattle" will appear in our next issue.

The Markets.

TOP PRICES FOR FRUIT—ROMA-STREET MARKETS.

Article.	MAY. Top Prices.
Apples, Eating	9s.
Apples, Cooking	8s.
Apples, American, Eating	...
Apples, American, Green	...
Lemons, Italian, per 360	22s.
Lemons, Italian, per 180	10s. 6d.
Lemons, American, per 180	...
Lemons, New South Wales	8s.
Oranges, Italian	...
Oranges, Local	4s. 6d.
Oranges, Sydney (packers)	5s.
Mandarins, Local	10s. 6d.
Mandarins, Sydney (packer)	8s.
Apricots, New South Wales, boxes (half-gincase)	...
Apricots, Queensland, half-case	...
Plums, half-gincase	...
Peaches, half-gincase	...
Nectarines, half-gincase	...
Gooseberries, English	...
Cherries	...
Passion Fruit, quarter-case	7s.
Mangoes	...
Pineapples, rough	2s. 3d.
Pineapples, Queen	5s. 6d.
Melons	...
Rockmelons	...
Bananas, per bunch	1s.
Bananas, per dozen	2½d.
Tomatoes, quarter-case	1s. 6d.
Pawpaw Apples, quarter-case	1s. 6d.
Custard Apples, quarter-case	4s.
Granadillas, case	4s.
Seville Oranges, apple-case	4s.
Cape Gooseberries, quart	5½d.
Pears (Melbourne), export case	9s.
Pears (Tasmanian), quarter-case	6s. 6d.
Rosellas, per sugar-bag	1s.

AVERAGE TOP PRICES FOR MAY.

Article.		MAY. Top Prices. £ s. d.
Bacon	lb.	0 0 9½
Bran	ton	6 4 0
Butter, First	lb.	0 1 0¾
Butter, Second	"	0 0 10
Chaff, Mixed	ton	4 15 0
Chaff, Oaten	"	6 10 0
Chaff, Lucerne	"	5 1 0
Chaff, Wheaten	"	5 10 0
Cheese	lb.	0 0 8
Flour	ton	12 16 0

AVERAGE TOP PRICES FOR MAY—*continued*.

Article.		MAY. Top Prices.
		£ s. d.
Hay, Oaten	ton	5 18 0
Hay, Lucerne	"	3 6 0
Honey	lb.	0 0 2⅘
Rice, Japan (Duty paid)	ton	22 5 0
Maize	bush.	0 4 0⅘
Oats	"	0 4 0
Pollard	ton	7 5 0
Potatoes	"	4 12 0
Potatoes, Sweet	"	1 18 0
Pumpkins	"	2 6 0
Sugar, White	"	20 10 0
Sugar, Yellow	"	18 10 0
Sugar, Ration	"	15 10 0
Wheat	bush.	0 5 10⅕
Onions	cwt.	0 4 11½
Hams	lb.	...
Eggs	doz.	0 1 5
Fowls	pair	0 4 5½
Geese	"	0 5 10½
Ducks, English	"	0 5 0⅕
Ducks, Muscovy	"	0 5 7⅗
Turkeys, Hens	"	0 9 0
Turkeys, Gobblers	"	0 15 4⅘

ENOGGERA SALES.

Article.	MAY. Top Prices.
	£ s. d.
Bullocks	10 8 6
Cows	7 7 6
Wethers, Merino	0 19 8½
Ewes, Merino	0 16 10½
Wethers, C.B.	1 1 7½
Ewes, C.B.	1 0 9
Lambs	0 14 2
Porkers	1 19 0
Slips	0 13 0

Orchard Notes for July.

BY ALBERT H. BENSON.

The remarks that have appeared in the Orchard Notes for the last three months anent the handling, packing, and marketing of citrus fruits apply equally to the present month.

The pruning of all kinds of deciduous fruit trees should be completed during the month. All prunings should be gathered and burnt, and the tree should then receive a thorough spraying with the lime, sulphur, and salt wash, which is the best all-round winter spray, acting both as an insecticide and a fungicide. After pruning and spraying, the orchard should be well ploughed, so as to bury all weeds and trash that may have accumulated, to sweeten the soil, and to break up any pan that may have been formed by summer cultivation.

Citrus trees, from which the fruit has been gathered, should be pruned now, the pruning to consist of cutting out all dead branches or branches having borers in them, as well as all branches, thorns, or twigs growing in the centre of the tree which are not required. The centre of the tree must be kept well opened up, as, unless this is done, the superfluous wood only forms a harbour for all kinds of insect and fungus pests, and, in addition to this, where the tree is not well pruned out in the centre, it is impossible to do good work with the spray pump.

As already stated, all the prunings from the tree should be gathered and burnt, as this is the surest way of destroying any scale insects, borers, or fungus pests with which they may be infested. If you have no spray pump, then the above mixture should be applied with a brush. It will destroy all scale insects with which it comes in contact, and will remove all moss and lichen as well as stop the spread of canker or bark rot.

The planting of deciduous trees can be continued throughout the month, but it is not advisable to delay it more than can be helped, as when the trees are planted, even though they make no leaf or wood growth, they begin to throw out adventitious rootlets which are ready to start work as soon as the first top growth takes place. Don't plant too deep: the depth at which the young trees stood in the nursery is the right depth; trim the roots carefully, so as to remove all bruised portions; spread the roots out well, so that they may get a good hold of the ground, and always spread a little fine top soil round them, as this will be conducive to the rapid formation of new roots.

Cut back hard at planting, and don't be afraid that you will spoil your tree by doing so. Failure to cut hard back prevents the formation of a strong, well-grown, symmetrical tree, and always tends to injure the future vigour and growth of the tree.

See that all trees that are planted, whether deciduous or evergreen, are free from pests, as it is much easier to keep disease out of the orchard by planting clean trees than it is to stamp out disease once it has got a fair hold. Where the trees are infested with scale insects of any kind, they should be treated by hydrocyanic acid gas, as recommended and described from time to time in this *Journal*. If this treatment of the young trees is carefully carried out, there is every chance of their remaining clean for a considerable time after they are planted.

Do not plant rubbish; only plant those trees that your soil and climate are adapted for. Do not try to grow fruits that will only end in failure, as no grower who is dependent on fruit culture for his living can afford to grow fruits that can be produced both better and cheaper by others under more suitable conditions; but he must confine his energies to the culture of those fruits that prove a commercial success.

It costs just as much to prepare the land for and to plant, prune, spray, manure, cyanide, and generally look after an inferior variety of fruit tree, or a

variety of fruit tree that is unsuitable to the climate, and from which no return of any value can ever be obtained, as it does to grow a variety that is suitable to the soil and climate, that will produce superior fruit, and for which there is always a ready sale. Therefore, I again repeat that no grower who is dependent on fruit culture for his living can afford to spend time or money in the growing and looking after unsuitable varieties of fruit trees.
Add to Agriculture

Farm and Garden Notes for August.

Farm.—Now is the time for busy work in the field, work which will produce rich results at harvest time. Clean the crops put in last month. Sow maize for an early crop. Get the potatoes planted as soon as possible, and only plant such as have sprouted. By doing this you get an evener and more certain crop than if the unshot seed is planted. In choosing maize for seed, select the larger, well-filled, flat grains. It has been shown that by constantly selecting seed from prolific plants as many as five and six cobs of maize can be produced on each stalk all over a field. Sow pumpkins, either amongst the maize or separately, if you have the ground to spare. Swede turnips, clover, and lucerne may still be sown, but they will have to contend with weeds, which will begin vigorously to assert themselves as the weather gets warmer. Therefore, keep the hoe and cultivator regularly going. Plant arrowroot, ginger, and sugar-cane. During this month, tobacco may be sown. If vines are available, sweet potatoes may be planted towards the end of the month. If grasses have not yet been sown, it should be done at once. Sugar-cane crushing in the tropical parts of the State will be in full swing this month. Should frost injure the cane in the Southern parts, it should be put through the rollers at once. Rice and coffee should be already harvested; but the picking of Siberian coffee begins this month. Plough out old canes and prepare the land for replanting.

In the North, collect Divi-divi pods. Orange-trees will be in blossom, and coffee-trees will be in bloom for the second time. As this is generally a dry month in the North, little can be done in the way of planting.

Kitchen Garden.—There is plenty of work to be done now in the vegetable garden, especially in destroying the aphis-infested plants. All spring and summer crops can be put in. Sow carrots, parsley, beet, lettuce, French beans, runner beans of all kinds, peas, parsnips, tomatoes, squashes, cucumber, melons, pumpkins, sweet corn, egg plant, mustard and cress, cabbage, sea-kole, kohl-rabi, radish, &c. Plant out rhubarb, horse-radish, herbs, sea-kole, asparagus, ginger, Jerusalem artichokes, and any cabbage plants which may be ready. Get all the potatoes planted as soon as possible. Attend to the thinning of such crops as require it, such as carrots, turnips, parsnips, &c. Peas should be supported by sticks or wire netting. Globe artichokes may be planted. Keep the weeds down by a free use of hoe and cultivator. As the cabbage and cauliflower beds become finished, plough or dig them up, and, if possible, allow the soil to be exposed to the air for a month or two before putting another crop in it. Pinch tops off broad beans when they come into flower, to make the fruit set. Give plenty of water to all vegetables, especially to cabbages during the dry weather.

Flower Garden.—Ferneries will require overhauling, and top dressing with a mixture of sandy loam; some plants will require staking, others thinning out. The roses will have already been pruned, but look at them occasionally, and help them by rubbing off here and there a shoot with a tendency to grow in and crowd the centre of the bush. Plant out antirrhinums, pansies, hollyhocks, verbenas, petunias, &c. Sow zinnias, amaranthus, balsam, chrysanthemum, marigold, cosmos, cockscombs, phloxes, sweet peas, lupins, &c. Plant gladiolus, tuberoses, amaryllis, pancratium, ismene, crinums, belladonna, lily, and other bulbs. Dahlias would be more advantaged by placing them in some warm, moist spot, when they would start gently, and be ready for planting out a month or two later.

DELEGATES AT THE AGRICULTURAL CONFERENCE, MARYBOROUGH, 6TH-9TH JULY, 1903.

Agricultural Conference.

AT MARYBOROUGH, 6TH, 7TH, 8TH, AND 9TH JULY, 1903.

An Agricultural and Pastoral Conference, organised by the Department of Agriculture—similar to the Conferences held at Gatton in 1897, at Rockhampton in 1898, at Mackay in 1899, at Warwick in 1900, at Bundaberg in 1901, and at Toowoomba in 1902—was held at the Oddfellows' Hall, Maryborough, on the 6th, 7th, 8th, and 9th of July, 1903, and was attended by eighty representatives from seventy-six agricultural, horticultural, and pastoral societies of the State. The delegates were—

The Hon. D. H. Dalrymple, M.L.A., Secretary for Agriculture, in the chair.

National Agricultural and Industrial Association of Queensland, Brisbane—J. A. Hayes. Queensland Chamber of Agriculture, Brisbane—The Hon. A. J. Thynne, M.L.C., and F. W. Peek. Queensland Stockbreeders and Graziers' Association, Brisbane—R. Cliffe Mackie. Queensland Fruit and Economic Plant Growers' Association, Brisbane—A. Wagner. Queensland Citrus-growers' Association, Brisbane—B. J. McKay. Queensland Acclimatisation Society, Brisbane—E. Grimley. Horticultural Society of Queensland, Brisbane—W. Ewart and J. Soutter. Zillmere Horticultural Society, Zillmere—A. W. Richardson. Nundah Horticultural, Agricultural, and Industrial Society, Nundah—W. Ewart.

Mount Cotton and Redland Bay Fruit-growers' and Farmers' Association, Mount Cotton—W. Fielding. Logan Farming and Industrial Association, Beenleigh—W. G. Winnett. Southern Queensland and Border Pastoral and Agricultural Association, Nerang—R. Weedon.

Ipswich and West Moreton Agricultural and Horticultural Society, Ipswich—H. E. Wyman. Queensland Pastoral and Agricultural Society, Ipswich—H. Sinclair. Forest Hill Agricultural and Progress Association, Forest Hill—J. McCartney. Ma Ma Creek Farmers' Progress Association—P. Larsen. Lockyer Agricultural and Industrial Society, Laidley—A. Hunter. Harrisville Farmers' Progress Association, Harrisville—W. J. Burnett. Rosewood Farmers' Club, Rosewood—W. Berlin.

Drayton and Toowoomba Agricultural and Horticultural Society, Toowoomba—H. A. Tardent. Crow's Nest Agricultural and Horticultural Society, Crow's Nest—L. D. Ward. Darling Downs Agricultural and Industrial Association, Clifton—J. Gillam. Central Downs Agricultural and Horticultural Association, Allora—W. Deacon. Eastern Downs Horticultural and Agricultural Association, Warwick—W. D. Lamb. Danderoo Farmers' Progress Association, Danderoo—W. Atkinson. Stanthorpe Viticultural and Horticultural Society, Stanthorpe—R. Hoggan. Border Agricultural, Horticultural, Pastoral, and Mining Society, Stanthorpe—G. Simcocks.

Northern Downs Pastoral and Agricultural Association, Dalby—J. T. Bell, M.L.A., and J. Clarke.

Western Pastoral and Agricultural Association of Queensland, Roma—D. Brown. Wallumbilla Selectors' League, Wallumbilla—P. Rochat. Warooby Farmers' Association, Blythdale—S. L. Jones. Yingerbay Farmers' Association, Yingerbay—G. D. Smith.

Mount Mee Farmers' Association, Mount Mee—J. Robinson. Palmwoods Fruit-growers' Industrial and Progress Association, Palmwoods—G. Fewtrell. Montville Fruit-growers and Farms' Association—G. Butt. Maroochy Pastoral, Agricultural, Horticultural, and Industrial Association, Woombye—P. S. Hungerford. Mapleton and Dulong Fruit-growers and Farmers' Progressive Association, Mapleton, *viâ* Nambour—D. Smith. Dulong and Kureelpa Cane-growers and Farmers' Association, Nambour—F. M. Murtagh. Buderim Mountain Coffee and Fruit Growers' Association, Buderim Mountain—J. Lindsay.

Gympie Agricultural, Mining, and Pastoral Society, Gympie—J. Dobson. Chatsworth Farmers' Progress Association, Gympie—J. H. Spiller. Deep Creek Farmers' Progress Association, Gympie—E. Wright.

Wide Bay and Burnett Pastoral and Agricultural Society, Maryborough—A. W. Cameron and W. Hatton. Maryborough Horticultural Society, Maryborough—H. A. Jones and R. G. Dawson. Mary River District Agricultural and Progress Association—C. Nahrung. Biggenden Agricultural and Pastoral Society, Biggenden—F. G. Jones. Degilbo District Farmers' Association, Degilbo—W. F. Warmington and R. Wallace. Mungore Farmers' Association, Lakeside—F. G. Jones. Brooyar Farmers' Progress Association, Brooyar—J. T. Pike. Tinana Fruit-growers and Farmers' Association, Tinana—H. E. Bray. The Island Farmers' Progress Associatian, Maryboryugh—J. E. Dean.

Bundaberg Agricultural, Pastoral, and Industrial Society, Bundaberg—F. H. Palmer and H. E. Ashley. Bundaberg Horticultural Society, Bundaberg—H. E. Ashley. Pastoral, Agricultural, and Industrial Society, Childers—R. Beiers and G. Martin, M.L.A. Avondale Planters and Farmers' Association, Avondale—A. M. Broom. Booyal Farmers' Progress Association, Booyal—N. L. Rosenlund. North Isis Cane-growers' Association, Hapsburg—A. C. Walker. Woongarra Cane-growers and Farmers' Association, Ashgrove, Bundaberg—J. Clarke. New Hope Farmers' Association, Birthemba—G. W. Nixon. Kolan Cane-growers and Farmers' Association, Colanne—T. Petersen. Isis Agricultural Association, Childers—W. Beale.

Rockhampton Agricultural Society, Rockhampton—C. Dallon. Central Queensland Farmers and Selectors' Association, Rockhampton—E. Adams. Central Queensland Stockowners' Association, Rockhampton—G. Fox, M.L.A. Alton Downs Farmers' Association, Rockhampton—J. Hanley. Gracemere District Farmers' and Progress Association, Gracemere, Rockhampton—H. Schirmer. Stanwell United District Farmers' Union, Stanwell, Q.C.R.—G. N. Terry.

Pioneer River Farmers and Graziers' Association, Mackay—C. P. Mau. Bowen Fruit-growers and Farmers' Association, Bowen—G. Turner. Bowen Pastoral, Agricultural, and Mining Association, Bowen—W. S. Palmer. Proserpine Farmers and Settlers' Association, Proserpine, Bowen—C. P. Mau. Victoria Farmers' Association, Ingham—J. W. Cartwright. Halifax Planters' Club, Halifax—A. Campbell. Cairns District United Farmers' Association, Nelson, Cairns—J. Mann. Port Douglas and Mosman Pastoral, Agricultural, Horticultural, and Mining Association, Port Douglas—J. Crees. Mosman Farmers' Association, Port Douglas—S. Archbold.

Officers of the Department of Agriculture.—Peter McLean (Agricultural Adviser), A. H. Benson (Instructor in Fruit Culture), Wilmot C. Quinnell, M.R.C.V.S. (Government Veterinary Inspector).

Apologies for non-attendance were received from Mr. W. R. Robinson, of the Royal Agricultural Society of Queensland, Toowoomba; J. W. Carpenter, of the Mooloolah Farmers and Fruit-growers' Progress Association; and F. Crystall, of the Currajong and Gin Gin Agricultural and Pastoral Society.

FIRST SESSION.

Monday, 6th July, 1903, 7·30 p.m.

Proceedings were commenced by the welcoming of the delegates to Maryborough by the Mayor, Mr. A. Dunn, and by Mr. A. W. Cameron, the president of the Wide Bay and Burnett Pastoral and Agricultural Society. The Hon. D. H. Dalrymple, M.L.A., returned thanks, on behalf of the delegates, for their hospitable reception, and concluded by delivering the following speech:—

CHAIRMAN'S ADDRESS.

It gives me much pleasure to welcome you all to this, the seventh Conference of farmers' delegates convened by the Department of Agriculture. I am pleased at the large attendance to-day, though, for an obvious reason, it is not quite equal to that of last Conference. Hitherto, many of the societies represented here were allowed free passes for more than one delegate, but owing to the fact that the Railway Department now expects payment for services rendered to other departments, and the Treasurer can now spare a less sum for the Agricultural Department than formerly, it was found necessary to restrict the passes to one delegate from each society. I am glad, however, that this circumstance has had no effect on the amount of business to be transacted, for the subjects set down for consideration to-day are as numerous and as important as at any previous gathering of this kind. To those gentlemen who have prepared papers I tender the warmest thanks, and I am sure that our appreciation will be shown in the most practical and unequivocal of all ways—that of listening with attention and of discussing with intelligence and earnestness the views put forward. It is a matter for congratulation that we meet under more hopeful prospects than at any previous Conference at which it has been my privilege to preside. At the time the last Conference was held, the country generally was, from the farmer's point of view, in a most deplorable condition, with few signs of improvement visible. Drought, extended over an unprecedented area and protracted beyond any hitherto experienced, was what we had to face just then. However, the country has now seen the worst, and there is every prospect of a good season and perhaps of many good seasons to follow. The calamities through which we have passed will not be without their good effect if they induce us, as I am convinced they will, to take measures which will enable us to cope better with future droughts. Probably nothing that we could have done would have sufficed to prevent severe losses from this cause. But it has been abundantly proved that the losses, in stock in particular, would have been considerably less if we had had the foresight to take the necessary steps to conserve and utilise the surplus water that comes in years of ordinary rainfall, or to get ready access to the stores that are to be found beneath our feet. It is to be hoped that never again will our dairymen and grazing farmers be unprepared for such an emergency, and that for the sake of, at least, their breeding stock they will have a patch of cultivation that will be independent of local rainfall. You may be sure that whatever the Department can do to aid the good work will be done commensurately with the means placed at its disposal by Parliament. The Department has gone as far as its means will allow in making experiments and disseminating information in this important matter, and hopes to be able in the future to do more in the same direction. For the first time, and, as another result of the drought, the Department this year had to procure and distribute seed wheat on a large scale. This undertaking has been carried out in a manner creditable, I think, to the Department and satisfactory to the farmer, for which much praise is due to the Agricultural Adviser and to his colleague in the matter, Mr. W. D. Lamb, whom I am glad to see here to-day. I have also to say that, in order to help our vignerons to replant their vineyards destroyed by the drought, it has been necessary to relax the provisions relating to the introduction of grape cuttings, as there is not a sufficient supply available in Queensland. But we have taken the precaution to allow importations only from a country where we know phylloxera not to exist; and, to "make assurance double sure," such importations shall be subject to inspection and treatment by the officers of the Department.

I am also happy to be able to state that the work of analysing and classifying the soils of Queensland is making progress. This is particularly true of the sugar districts, and a beginning has been made in the same direction with regard to other portions of the colony. Similarly, an exhaustive analysis of the plant products of Queensland has been commenced. That these investigations and the conclusions they may lead to will be of the most reliable character is evidenced by the fact that they are under the direction of Dr. Maxwell, to whom the State is also indebted for the soil analyses and the irrigation experiments already referred to. I think that I can take some credit for having taken the action by which, eighteen months ago, the Chemical Branch of this Department was placed on a more satisfactory footing than formerly, thanks to the alacrity with which Dr. Maxwell received and entered into my proposals. I was in hopes that Dr. Maxwell would be able to be present to-day, but the duties imposed upon him by the needs of his Sugar Bureau render that impossible. However, we are not to be totally deprived of his counsel, for on the programme I notice that a paper written by him is to be read on a subject we discussed at the last Conference he attended. I am glad to take the opportunity of thanking him, not only for this favour, but for the valuable information and advice he has given me on all matters which I have referred to him, and to express my belief that our agriculturists are to be congratulated on our having a man so competent and so willing to assist them.

Principal Crops.

Turning to the agricultural results of the past year, I think some particulars of the principal crops may be of interest. In 1901, out of 507,317 acres farmed, 23,857 were in fallow. In the following year, out of 478,121 acres, 202,738 were in fallow. It cannot be wondered at, therefore, that agricultural production diminished considerably, and, in some important lines, practically ceased. In spite of the diminished yields, however, the increased prices improved the value of agricultural exports from £1,054,952 in 1901 to £1,227,481 in 1902.

On the other hand, the value of pastoral exports decreased from £4,750,353 in 1901 to £3,934,174 in 1902. The principal items of the increased agricultural exports were sugar, molasses, and green fruit. In dairy produce there was a considerable falling off. As might have been expected, irrigation received increased attention in consequence of the long drought. During the previous decade the quantity of land irrigated increased slowly from 5,000 to 10,000 acres, and last year it rose to 15,000 acres. From all I can learn there will be an even more marked increase this year. On every side there are indications that this year will be a most productive one, especially in the crops that failed last year. It is thought that there will be about 110,000 acres under wheat and 8,000 under malting barley. The land probably was never in better condition, the seed is all that could be desired, and the season promises to be propitious, the result of which will probably be a crop of cereals such as Queensland has never before produced.

Sugar.

Though the sugar crop did not suffer as much as the wheat, it, too, had a disastrous experience, especially in the Southern districts of the State. The total area under cane was 85,338 acres, 59,102 acres of which were crushed, yielding a crop of sugar-cane of 641,927 tons, from which was produced 76,626 tons of sugar. This was the smallest return since the year 1893. The quality of the juice was exceptionally rich, and in part compensated for the shortage of cane. The tonnage of cane required to make a ton of sugar was considerably below the average—namely, 8·38 tons of cane to 1 ton of sugar, as against 9·76 tons the previous season. From a table that has been prepared I gather that, comparing 1902 with 1901, there was, in the latter year, a decrease of 538,164 tons of cane and 44,232 tons of sugar, representing, approximately, a loss of £486,500, of which £269,000 is the cane-grower's share at an average of 10s. a ton for cane. Probably none of our producers have been more forcibly impressed than our cane-growers with the absolute and urgent necessity that exists for irrigation, not only to increase the yield, but to guard against total loss, and it is satisfactory to note that irrigation is now receiving practical application at several places, whereas a few years ago it was only at one—namely, the Burdekin. The area of sugar land now under irrigation is estimated at 7,500 acres, an increase of 3,000 over that of the previous season. The net exports of sugar between the 30th June, 1902, and the 31st March, 1903, amount to 58,357 tons; and if to this is added 30,862 tons, the estimated requirements of the State, it will be seen that the previous season's stocks have been largely drawn on and have practically been absorbed.

Fruits.

Despite the extremely unfavourable season, the fruit industry of this State has continued to make steady progress, and fruit-growers have every confidence in the permanence of the industry. This is shown by the demands for land suitable for fruit cultivation, particularly in the North Coast and Stanthorpe districts and by the large number of new trees being set out in these and other districts. The crop has necessarily been a small one, except in very favoured localities, but the actual total destruction of fruit trees has been comparatively small, and that chiefly amongst old trees or as the result of neglect. The bulk of our orchards have made a remarkably rapid recovery from the effects of the recent drought; and, as far as can be judged from present indications, the output for the next season will be a good one. The important question of irrigating fruit trees during dry periods has received a considerable amount of attention, many growers having erected small irrigation plants from which they have obtained substantial returns. This is a very important question for the fruit-growers of the State, as the conservation of water and utilisation by them during rainless periods, which occur at frequent intervals, even during what are termed good seasons, will do more to increase the quantity and quality of our output and put the industry on a profitable footing than anything else they can do. Fruit pests of all kinds have been troublesome, but the fruit-grower now realises the importance of taking immediate steps to keep them in check, with the result that they are not so much dreaded now as they were a few years since. The marketing of fruit is receiving more attention, and the work of the Citrus Growers' Association in this respect is being appreciated and largely taken advantage of by fruit-growers generally. Much is still needed, however, in this respect, particularly in the distribution and utilisation of our fruits; and there is still far too great a margin between the price obtained by the producer and that paid by the consumer. This matter is, however, receiving careful consideration, as the successful extension of the industry demands an increased market, and this will be obtained both by the opening up of new markets and by the better developing of those which we have.

Viticulture.

Vines in almost all the districts where cultivated in Queensland have, in common with other fruit trees, suffered very severely from the past season's drought. Generally speaking, the crop of grapes was a total failure; but on the coast the growers were more fortunate, and marketed, at remunerative prices, a fairly good crop. This may be ascribed to those localities having received some good showers of rain which did not travel inland. There can be no doubt that the coastal district of Southern Queensland is particularly well adapted for raising certain varieties of early table grapes, and is destined to cultivate a large acreage of vines in the near future for supplying Brisbane and the Southern markets with early table grapes.

Competition from the South and a succession of dry seasons in this State have seriously hampered Queensland wine-makers. Nevertheless, the leading vignerons continue to maintain a business that was not anticipated under so many adverse circumstances, and with a return to normal seasons they may be expected to increase materially their output, since the State's consumption of wine is increasing considerably. The drought, which has lasted so long in the Roma district, has caused a considerable loss of vines there; but, by selecting the most approved varieties of wine grapes when replanting, vignerons will be in a better position to meet the competition of Southern wines, and to produce some that will vie with them in quality. In the direction of the port and sherry class of wines there are great possibilities in the Roma district. This season, for the first time, consignments of table grapes grown in South Australia reached the Brisbane market. The care and attention given to the selecting of the bunches and the packing in the cases should be an object lesson to Queensland grape-growers, as these points are of vital concern to the industry. But, as far as flavour and quality of the fruit are concerned, the imported article was not to be compared to Roma grapes in a normal season. The numerous applications for large numbers of grape cuttings made to the Department this winter shows that the industry is increasing in importance very considerably.

Tobacco.

Although irrigation has not been applied to the farm at Texas, on which the Department is endeavouring to show the growers the best methods of cultivating and handling, the work done was so satisfactory that, notwithstanding the absence of rain, some two tons of tobacco were raised, cured, and sold at the highest figure in the open market.

At this farm operations are carried on to prove that tobacco can be raised as a profitable crop by European labour, and it may be mentioned in support of this notion that, excepting the salary of the instructor, Mr. Nevill, the working expenses of the farm have been met during the past two years of exceptionally dry weather by the revenue received from the produce. If this can be done in a period of scarcity, a fair profit may reasonably be expected in years of prosperity. The two years referred to were the initial years of the farm, and the difficulties of immature land had, of course, to be reckoned with. The results of this object lesson are, that Europeans in the Texas and Inglewood districts are turning their attention to the cultivation of tobacco with greater interest, the area placed under crop for 1903 will show a substantial increase to that of former years, and the tobacco industry should become an important item amongst agricultural products. Since the establishment of the Commonwealth the supply of Australian-grown tobacco has not equalled the demand, and, provided the material offered for sale is of good quality, the market can absorb much more than will be produced for many years to come.

Dairying.

In no industry was the drought so keenly felt as in that of dairying. This cannot be better illustrated than by stating that, generally speaking, a reduction in the output of butter and cheese of over 50 per cent., as compared with that of 1902, was experienced. The butter figures for the two years are—1901, 9,741,882 lb.; 1902, 4,851,362 lb. The cheese output fell from 2,436,912 lb. in 1901 to 952,003 lb. The condensed milk manufactured fell away in value from £12,698 in 1901 to £7,097 last year. Towards the end of the year and in the early months of this year, the increase in the output per month was on the average not less than 10 per cent. Last year some 28,414 lb. of the local manufacture were exported, although, when it is noticed that no less than 2,246,762 lb. were imported during the same period, it is, perhaps, over-sanguine to calculate on the early establishment of an export trade in this product, yet it is a hopeful sign that under such extraordinarily adverse circumstances any such export should have been attempted. The outlook for the dairying industry is just now very bright, indeed. Farmers in the Southern, Central, and Northern districts are busy promoting companies, chiefly on co-operative lines, with the object of establishing butter and cheese factories, whilst valuable stud dairy cattle are being introduced into the State from the best-known herds in the Southern States.

BACON, HAMS, AND PORK.

The adverse seasons have greatly influenced the output of bacon and hams, the figures given by the Registrar-General showing that, whilst in 1901 7,064,714 lb. were cured, in 1902 the total quantity was 6,512,952 lb., a decrease of 551,762 lb. for the year, which, however, is proportionately less than that for 1901 as compared with 1900, which amounted to 620,732 lb. Nearly 1,000,000 lb. of bacon and hams were exported last year. Salt and fresh pork, weighing 841,673 lb., were also produced during the year, showing an increase of 179,173 lb. over the previous years. In all, 7,354,625 lb. of bacon, ham, and pork were obtained from the 88,416 hogs slaughtered during the year, giving an average of 83 lb. per hog. This industry is without doubt, given a run of normal seasons, going to increase by leaps and bounds; and, when we contemplate the opportunities offering for its success, it must be admitted that it will in the near future prove a source of profit to many of our small farmers and graziers.

MEAT AND DAIRY PRODUCE ENCOURAGEMENT ACT.

No new advances have been made to either meat or dairy works during the past year under the provisions of the Meat and Dairy Produce Encouragement Act, the continued drought conditions practically paralysing dairy expansion throughout the State, and preventing the possibility of any new meatworks being erected. The meat companies who, under very adverse circumstances, continued their operations, were rewarded for their courage by, in most cases, very handsome profits. Those companies who have received advances under these Acts have for the most part met the payments demanded from them, notwithstanding the high prices ruling for stock. As indicated at the last Conference, I am now pleased to be able to report that a sum of £19,000 has been returned to the stockowners in the Central, Southern, and Northern districts who in 1894 and 1896 contributed to the Meat Fund under these Acts. With these facts before us, I consider that it must be acknowledged that the £100,000 advanced under these Acts upon meatworks has, under very trying circumstances, proved a great success, and more than justifies the advances made. The advances made on the various classes of dairy works have likewise proved a success, although, owing to the adverse seasons experienced of late years, now we hope happily passed, to a more modified extent than in the case of the meatworks.

LIVE STOCK AND MEAT EXPORT.

At last year's Conference a melancholy picture of the pastoral industry had to be presented. The breaking up of the drought in the earlier months of the present year has had the effect of greatly brightening the outlook. On every side we have abundant proof of the wonderfully great recuperative powers of our pastures. The freezing works in the State, with one exception, are now in full operation—namely, two in Southern, two in Central and three in Northern Queensland; and although we have for the present lost our hold on the English meat market in competition with Argentina, existing contracts with South Africa and Manila will keep the works in operation for some months to come. The prices at present paid by the companies for fat cattle average £1 per 100 lb.; and if it pays to export at that rate, it is evident that the low prices formerly realised for stock are not likely to be experienced for many years to come. The wool clip of last year was poor, the export having been under 30,000,000 lb., but, as showing the severity of the season, the export of sheepskins was the largest in the history of Queensland. The export trade in horses to India continues active, large shipments being made monthly, but, if we can hope to maintain this trade, active measures will have to be taken to adapt the quality of our horse stock to the terms of the buyers.

An unfortunate outbreak of swine fever occurred in April in the Brisbane district. The Department adopted vigorous measures to stamp it out, and it is hoped and thought that our efforts will before long prove successful. A careful and continuous inspection of all pigs in the district will be kept up for some time to come.

You will have noticed that, in speaking of our agricultural and allied industries individually, I have found it necessary to refer to the disastrous effects of the drought on every one of them; and yet from the drought, certain advantages have followed, though, of course, not to the extent of compensating for the evils it caused. It destroyed our wheat crop; but at least it forced us to get elsewhere wheat seed far better in quality than much of that which would otherwise have been sown. It played havoc with our vines; but it has created an opportunity to replant with vines in many instances of a superior quality. It thinned our dairy herds; but our dairymen are in some cases replacing them with imported stock of a better kind.

I have only to add that I hope we shall all enjoy our week at Maryborough, and that our deliberations will be both pleasant and profitable. In one respect this Conference will have an advantage over its predecessors, and that is in numbering so many members of the Legislature among its components. After all, under our system of Government, no important State action can be taken or, at any rate, persisted in, without the approval of Parliament, and those amongst us who have views to put forth have a rare opportunity of earning support for them from gentlemen who are always listened to with attention and respect "in another place." In Mr. Thynne, who has not yet arrived, and who therefore I can for once accuse of not being "in his place," we shall have among us a man who has rendered great services to agriculture, and is indeed always to the fore in any movement for the benefit of his fellows, regardless of the labour it may impose on him. Then there is Mr. Fox, who has paid special attention to the financial necessities of the small settlers, and has made himself conspicuous in the House by his tireless efforts to increase the scope of the Agricultural Bank Act. And there is Mr. Bell, whose eloquence would do honour to any deliberative assembly, and whose name is associated with another legislative proposal of high importance to farmers. I consider it no small advantage to have such men amongst us, for not only will they add value to our debates, but they will be in a position afterwards to plead for parliamentary sanction for such of our recommendations as may require it.

COMMITTEE OF RESOLUTIONS, Etc.

On the motion of Mr. P. McLean, the following were appointed a Committee of Resolutions:—Messrs. A. Campbell (Halifax Planters' Club), C. P. Mau (Pioneer River Farmers' and Graziers' Association, Mackay), G. Turner (Bowen Fruit-growers and Farmers' Association), A. C. Walker (North Isis Cane-growers' Association), W. Deacon (Central Downs Agricultural and Horticultural Society, Allora), A. W. Cameron (Wide Bay and Burnett Pastoral and Agricultural Society, Maryborough), A. Wagner (Queensland Fruit and Economic Plant Growers' Association, Nundah), W. D. Lamb (Eastern Downs Horticultural and Agricultural Association, Warwick), W. G. Winnett (Logan Farming and Industrial Association, Beenleigh), F. M. Murtagh (Dulong and Kureelpa Cane-growers and Farmers' Association, Nambour), G. Simcocks (Border Agricultural, Horticultural, Pastoral, and Mining Society, Stanthorpe), and P. McLean (Agricultural Adviser)—the last-named to be convener. It was also resolved that speakers discussing papers be allowed to speak once only on each subject, and not longer than 5 minutes; the readers of papers, however, to be allowed 10 minutes to reply.

Mr. Wilmot C. Quinnell, M.R.C.V.S.L., Veterinary Inspector to the Department of Agriculture, then read the following paper on—

SWINE.

Life History and General Account of the Pig.

(By Wilmot C. Quinnell, M.R.C.V.S., Lond.)

In approaching this subject I feel that it may be lacking of interest since we cannot fall back on an attractive history of this particular mammalian.

Whilst the origin of some of our domesticated animals is involved in obscurity, so great have they become altered by cultivation, the pig retains so much of his original character that we have no difficulty in tracing the resemblance even in the varieties that have been most extensively altered.

According to high geological authorities, the boar was coeval with extinct species of the *Mastodon* and *Dinotherium*, and hence must be regarded as the most ancient of our domesticated animals.

We find mention of him in both sacred and profane history. Domestication began long before the dawn of history.

The earliest known domestic animal was the dog. The domestic dog (*Canis familiaris*) is, to quote the perhaps extravagant words of Cuvier, "the most complete, the most singular, and the most useful conquest ever made by man." The origin of this subjugation is shrouded in immemorial antiquity. Canine remains accompany those of man in the Danish kitchen middens belonging to the Neolithic period. Next came the *pig*, found in Polynesia; then the reindeer, later the sheep, cow, horse, goat, camel, elephant, yak, and cat.

Again, the inhabitants of the Lake dwellings of Switzerland are the oldest agriculturists and stock-keepers known to us. Amongst their relics we find the bones of oxen, dogs, pigs, and goats, as well as of wild animals.

The pig is the only section of the many-toed division of pachydermatous mammalia that has been reclaimed; for though his ally, the elephant, has been made useful in individual cases, the race continues wild, and it is said that when subjected to captivity fertility almost ceases.

Like the other thick-skinned animals with which it is allied—the elephant, rhinoceros, hippopotamus, and tapir—the pig delights in humid and shadowy places.

The thick skin of the pig, which is well cushioned with fat, is rather insusceptible to external injury, and it is for this reason that the pig is found almost in any climate, and has the widest geographical extension.

The pigs (Suidæ) are distinguished by their long snout, flattened in front, small eyes, four-toed feet, short tails, strongly-built bodies, and in disposition by their remarkable courage and ferocity. They are represented in the Old World by the genus *Sus*, of which the wild boar of the continent of Europe may be looked upon as the most typical species. This animal, unlike its domesticated descendant, our common pig, is covered all over with thick grizzled hair, has a longer and narrower head, and great projecting tusks, with which it can rip up and kill a man at a stroke. The species is spread all over Europe (now exterminated in England), North Africa, and Western Asia, being replaced in China and India by another very closely allied animal, almost identical in external appearance (*Sus cristatus*).

Other noteworthy Old-world species are the Papuan pig (*Sus papuensis*), of New Guinea, the Wart-Hog (*Phacochœrus*), and the peculiarly-coloured River Hog (*Potamocharus*) of tropical Africa; the Babirusa (*Babirusa alfurus*) of Celebes, an extraordinary hairless species, with long upward-curved tusks, which in old age may grow so long as to describe an almost complete circle. The Pygmy Hog (*Sus salvanius*) of Nepal and Assam, is noticeable for its diminutive size, being seldom more than 1 foot in height, and 2 in length, but is in other respects quite similar to the ordinary pig.

In the New World, pigs are represented by the peccaries (*Dicotyles*), animals much smaller than the ordinary wild boar, and differing in their skulls and dentition from the Old-world Suidæ.

Especially noteworthy is the fact that the upper canine teeth do not project outwards and upwards, and are less formidable weapons than the boar's tusks; but, notwithstanding this, the peccaries are more dangerous to man than any other of the pig tribe, as they herd together in bands of from fifteen to forty, and make most determined attacks.

In the *omnivora* (that is, where the digestive system is adapted for vegetable as well as for flesh food), as represented by the pig, the dental formula shows forty-four teeth—viz.: Twelve incisors or nippers, four canine or eyeteeth, twenty-four grinders, and four so-called wolf teeth—giving same number and distribution of teeth as in the majority of mammals of the earlier Tertiary period, but which is now found only in the genus *Sus*, and two genera of insectivora.

Teeth are always intimately related to the food and habits of the animal, and are therefore highly interesting to the physiologist. They form, for the same reason, important guides to the naturalist in the classification of animals.

There is also a close connection between the articulation or joint of the lower jaw and the nature of the food used by the animal. Thus in purely carnivorous animals, in which the teeth simply tear and cut the food, no grinding motion is required, and the jaw is capable only of a simple hinge motion in the vertical plane, while in herbivorous animals the joint is so constructed as to allow of extensive sliding and lateral motion of the lower molar teeth upon the upper. In the pig both the form of this articulation and the general character of the teeth point to an intermediate position in relation to food, and form a physiological argument for the mixed diet which general custom has decided to be most natural to the pig species.

Tusks (exaggerated canines) are of interest mainly on account of the extraordinary development of the canines in the male. The teeth—those of rodents—grow from persistent pulps, and thus admit of that extension which doubtless occurred at first as an abnormal variation, but has now become a constant character in the males.

The peculiarity is either transmitted by inheritance or reappears in every male in response to the constant re-occurrence of the same conditions.

The pig usually grows until five years old. Its natural life ranges from fifteen to thirty years.

The fecundity of the pig is great; with proper treatment it will produce two litters annually, generally of four to eight pigs each, although sometimes there are as many as fourteen in a litter.

Again, when allowed to run wild they multiply rapidly under favourable conditions; thus in New Zealand they became at one time a nuisance, and in Nelson Province three men killed 25,000 pigs in two years.

There are numerous varieties of the domestic pig. Some have erect and some pendant ears, and those are most esteemed which exhibit the greatest departure from the wild type; notably in shorter and less powerful limbs, less muscular and more rounder forms, wider ribs and greater wealth of flesh. It would take too long to touch upon the many now existing breeds and their peculiarities.

It is chiefly England and Austro-Hungary that produce the best breeds of pigs in the world.

The large white is, perhaps, the most widely distributed variety. It is being used extensively and with excellent results in the improvement of the pigs in Ireland, Scotland, and on the continent of Europe.

The pig is not inferior to other quadrupeds generally in intelligence, but it excels most of them in obstinacy. He has acquired a bad name as a dirty, unwholesome animal, whereas he is simply the victim of circumstances. He is naturally clean in his habits, and has a more sensitive nature than the other animals with which he is domesticated, and the too common filthiness of pigsties is rather the fault of their owners than their occupants. A clean and dry sleeping place for them is of great importance to the profitable keeping of pigs. A pig will not, any more than a human being, thrive on a foul, damp bed.

In our own time, or rather since the development of agricultural practice, and especially since the formation of the Royal Agricultural Society of England, there has been a wonderful transition of the pig of earlier times and those of the present. Take for illustration the domestic pig: The Irish "rint-payer" of fifty years ago was a long-legged, roach-backed, coarse-boned, and long-nosed specimen, that had to rout deep and travel far for its food. The improved animal of to-day is not allowed to rout, has at most a pleasant ramble through the stubbles after harvest, and lives for the rest of the year in well-sheltered yards or sheds; the snout loses most of its utility and disappears accordingly, until in some of the choicest specimens of the small white varieties the prominent forehead and enormously developed chop almost conceals it from view, and what there is is so ridiculously of *nez-retroussé* type that its grubbing abilities are reduced to a minimum.

So the improved pig of to-day is quite a different animal to its half-wild and wholly neglected ancestor, and occupies a most useful position in farm economy. Indeed, there is no food-producing animal which is of greater benefit to mankind than the pig.

Considering the importance which the pig industry has attained in other countries, it is a matter of surprise that more attention has not been paid to it in this State, where the conditions of farming in many parts, more especially in the coastal districts, offer great facilities for the raising of this class of stock, and also to the fact that there are a number of splendidly equipped bacon factories in the State.

It is said that one of the principal reasons why Danish bacon has taken such a hold on the English market, and has been so profitable to the farmers in Denmark, is the fact that they have fed their pigs largely on separated milk.

From an insignificant importation in 1886, it was reckoned, in 1896, that the import of Danish bacon to England had risen to the value of £3,000,000 sterling.

A farmer who sells his milk to a creamery can purchase separated milk, I am told, at from 2d. to 3d. for 10 gallons, a price which renders it a most profitable pig feed, provided that other crops, such as maize, rye, peas, mangolds, or pumpkins, are given to supplement the milk diet. Separated milk is very rich in albuminoids, and favours the production of lean, especially when the food to which it is added happens to be deficient in albuminoids.

If we wish to make pigbreeding pay as our butter and eggs pay, we must produce a first-class animal, therefore the breeding of swine must be carried on in conjunction with dairy farming.

From observations made at piggeries during the swine fever epidemic, I noted the crosses from various breeds are numerous, but unfortunately in the majority of cases the animals have deteriorated very considerably from want of care and selection in the breeding. So, whilst trying to impress upon the pig-raiser to prevent consanguinity or close breeding, I would strongly recommend him and all stock-raisers to become conversant—with the aid of elementary books—with the living organisation of the beast he wishes to breed, and these will materially aid him in selecting sound and vigorous animals of their respective kinds, and also in avoiding those errors in feeding and general treatment which are the most frequent causes of disease and disaster.

Mr. Quinnell then gave a lecture on Swine Fever, with the aid of lantern slides, manipulated by Mr. Mobsby, photographer to the Department.

SWINE FEVER.

Mr. Quinnell stated that, even at the commencement of the eighties, almost all the *epizootics* of swine were included in the collective name of "Swine Fever."

The researches of the last ten years, however, had enabled veterinarians to divide them from their respective etiology, symptoms, and anatomical changes, into three independent diseases, viz. :—

1. Swine Fever (Ger.: Schweine-pest);
2. Swine Plague (Ger.: Schweine-seuche);
3. Swine Erysipelas (Ger.: Schweinerothlauf);

the last being the main pig disease in Germany and France, but has not so far been demonstrated in Australasia.

In 1900, in a fatal outbreak amongst pigs in the Brisbane district, he isolated the specific organisms of Swine Plague; whilst in April last he detected true Swine Fever.

Mr. Quinnell explained the pathological action of the bacteria of Swine Fever and Swine Plague in the pig; and showed that in Swine Fever the primary disease was in the intestines, with perhaps secondary localisation in the lungs; whilst in Swine Plague, the primary disease was in the lungs, with secondary infection in the intestine.

[The disease was fully described in an article by Mr. Quinnell in the June issue of the *Journal*, p. 427.—Ed. *Q.A.J.*]

REFERENCE TO PLATES.

A—SWINE FEVER.

1. Cœcum (blind-gut) from a pig dead of Swine Fever, laid open to show the characteristic ulcers of the mucous membrane. The lesions take the form of rounded areas of dead tissue (necrotic) leathery in consistency, raised above the level of the surrounding mucous membrane of the gut.

2. Cœcum or blind-gut of pig. In rare cases the necrosis—instead of appearing in circumscribed ulcers as in No. 1—involves the whole surface of mucous membrane, giving it the appearance of a so-called *diphtheritic* membrane.

3. Cœcum, showing normal mucous membrane.

B—SWINE PLAGUE.

1. Pig's lungs. The line indicates the portion involved in disease—hepatized regions (liver-like).

2. Section of diseased lung—lungstructure hepatized due to broncho-pneumonia.

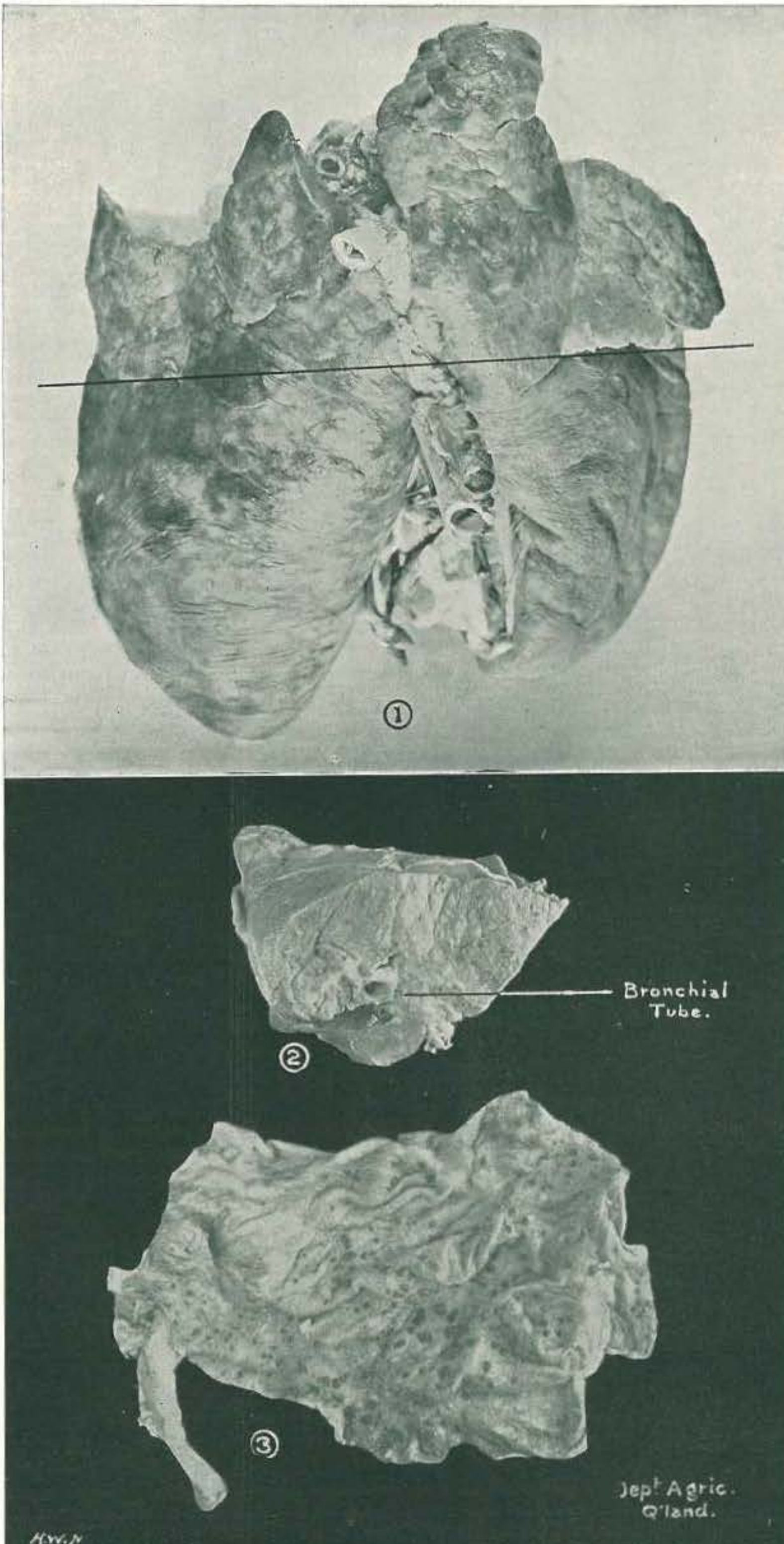
3. A peculiar croupous exudation on the mucous membrane, considered by Dr. Salmon, Chief of the Bureau of Animal Industry, Washington, as the effect of Swine Plague bacteria in the large intestine.

Mr. Quinnell's lecture was followed by a paper by Mr. W. S. PALMER, of owen, on—

WHAT THE GOVERNMENT MIGHT REASONABLY BE EXPECTED TO DO IN THE WAY OF ENCOURAGING PIG-REARING IN CERTAIN LOCALITIES.

Living as I do in a district possessing all the natural advantages required for the raising of pigs, and where so few are to be found on the farm (and I suppose there are lots of other districts in the same plight), I am led to think that a few suggestions as to what might be done by the Government to stimulate pig-raising in such localities will not be considered out of place or too unimportant to merit the attention of delegates to the Conference for a brief space of time. It is well known that in many districts (especially in North Queensland), the farmer has a hard fight at times to

Plate VII.



Swine Plague.

make two ends meet, and it is not unusual to find him occasionally compelled to leave the farm to engage in other pursuits, where the returns are more certain, to gain a livelihood.

Now, I think it will be admitted by all parties in politics, that it is the duty of a Government to give any reasonable assistance within its power to help the man on the land and to keep him there. I entirely agree with the action of the present Government in securing the services of such experts as Dr. Maxwell, Mr. Benson, Mr. Tryon, and others, and think the expenditure in this direction very proper, as it is sure to result in increased production from the various industries with which they are connected—thereby helping to make the sugar-grower, the fruit-grower, or the farmer, as the case may be, prosperous, and as a natural consequence, adding to the prosperity of the State.

It is on these lines that I think something might be done for the general farmer, and I propose to say a few words as to what the Government might reasonably be expected to do to induce him to raise pigs in certain localities.

I may say before going further, that by the term "certain localities," I mean localities that are isolated from a bacon-curing establishment.

If you ask the farmer why he doesn't keep pigs, he will tell you that it is because he cannot turn them into a marketable commodity which will successfully compete with that of the factory.

The farmer has no chance of getting into touch with the improved methods of dealing with the pig, and, I think, the Government should secure the services of a practical up-to-date man, who thoroughly understands the curing of bacon and hams, to go round among the farmers and give demonstrations. He should be qualified to tell them the best breeds to keep, and as regards food—what, when, and how much to give the animal to put him into the best condition for killing, and last, but not least, to show them how to manufacture good bacon on the farm.

If this were done, I think it would stimulate pig-raising—a very desirable thing at the present time when most farmers are at their wits ends to "keep the pot boiling."

I think that if an expert in general farm work were secured his services would be of immense value at the present time throughout the State, as, in addition to giving his attention to the industry I have already mentioned, he should be available to give practical demonstrations in the making of ensilage, &c.; but, as this is getting outside the subject-matter of my paper, I will leave it to others to deal with, and not trespass further on the valuable time at the disposal of the Conference.

The lateness of the hour precluded a discussion on the two preceding papers. On the following evening, however, Mr. Quinnell amplified his paper by giving a further address at the School of Arts to those delegates interested in pigs on swine fever, and answering a number of questions on the subject.

SECOND SESSION.

TUESDAY, 7TH JULY, 1903, 9·30 A.M.

In reply to an inquiry from Mr. W. D. Lamb, Mr. MCLEAN stated that the resolutions carried at the Toowoomba Agricultural Conference had been forwarded to the proper quarters and action taken upon them.

The first paper for the morning was one by Dr. WALTER MAXWELL, the Director of the Bureau of Sugar Experiment Stations, Bundaberg. Dr. Maxwell, being absent in the Northern portion of the State, the paper was read by Mr. McLean.

SORGHUM POISONING.

[By W. MAXWELL, Ph.D.]

It will be borne in mind that the subject of the effect of feeding green sorghum to animals, especially to cows, which are liable to have a very ravenous appetite for such succulent food, came up for discussion before the annual Agricultural Conference held in Bundaberg two years ago. At the instance of the Minister for Agriculture, the Hon. D. H. Dalrymple, I remarked, as bearing upon the question, that it was hardly a matter for general discussion, but rather one for special investigation by the laboratory. Those observations appear to have been amply confirmed by the results of examinations that have been undertaken since that time.

A preliminary notice has already been made by me to the Minister stating that, as a result of the examination of sorghum grown under our own direction in the

Botanical Gardens, it has not only been proven that a poison called hydrocyanic (prussic) acid is present in sorghum during stages of its growth, but that the proportion of poison thus found is very largely governed by the nature of the soil particularly its richness in nitrogenous elements of plant food.

I will explain that small plants of sorghum were planted in the Botanical Gardens, and in a soil almost exclusively sand in its composition. One series of plantings was allowed to grow without any special manurial assistance, and another series was manured with nitrate of soda, a manure whose chief element is nitrogen. This experiment was made in order to see if the supply of additional nitrogen to the soil affected the amount of prussic acid incorporated in the growing plant—nitrogen being an element of that poison. The results, according to repeated analyses made by Mr. J. C. Brünnich, who has carried out the laboratory work, have shown, with something approaching mathematical accuracy, that the supply of available nitrogen increases the amount of poison that the sorghum and other plants are capable of making and storing up within their composition. These facts fully prove the statement intimated by me at the Bundaberg Conference, that sorghum and similar plants, when grown on rich soils, would be more liable to contain highly dangerous amounts of the poison than when grown on soils poor in nitrogen. In other words, that the nature of different soils very largely governs the amount of danger.

Relating to the age or stages of development of the sorghum plant when it is most dangerous to allow animals to feed freely upon it, the investigations show that it is not safe to let stock have all that they will eat until the stage of growth when the sorghum is preparing to seed. The plant, when very young, and from the age of three up to seven weeks, contains distinctly dangerous amounts of prussic acid. After that age the poison rapidly disappears by decomposition, the nitrogen passing over into other and strictly nutritious elements of food. When the flowering stage is reached, not more than a trace of the poison is found. As the growth does not strictly depend upon the age or the number of weeks since it was planted, it is better to speak of stages of development, and for this reason it may be generally stated that the sorghum plant, until it approaches the flowering or seeding stage, is not safe for free feeding.

It must be understood, however, that even young sorghum and such plants as may be known to contain dangerous amounts of poison may be judiciously used as a green mixture with dry hay chaff to make the feed tasty to animals. When diluted in this way, the green sorghum being very carefully stirred up and mixed with large quantities of the dry food, no harm will follow, and the dry food is made capable of use. Yet it is necessary to very expressly repeat the certain danger of allowing stock to have free course to the young growing sorghum, since it is now proven that the whole trouble is due to the presence of the poison stated. The fact of the poison being prussic acid also accounts for the sudden fatalities following immediately upon cows having free access to sorghum, the prussic acid spreading rapidly through the system and having an almost immediate fatal effect.

It may here be stated that the plant-poisoning investigations have been extended to include also maize, sugar-cane, and most of the grasses in use. Prussic acid has been found in quantities varying from a mere trace up to the danger point. So far, however, only *Panicum muticum* comes anywhere near the sorghum plant in its dangerous content of the poison, several, including sugar-cane and *Paspalum*, so far as they have been tested, being completely free from prussic acid.

It is intended to extend, in due time, these examinations, bearing upon their poisonous contents, to all the crop plants grown or growing and made use of in the State. This is highly important work, the importance of which is more accentuated and brought to light during seasons of drought, when all available kinds of plant produce are pushed into service as feed stuffs. Incidentally, I may remark that the Experiment Station at Mackay is now making careful comparative tests of some eight or ten different varieties of sorghum, and not only for the purpose of observing their liability to contain poisonous elements, but also to determine their relative values as feed stuff. The results of these experiments and tests will be fully placed at the service of farming communities as soon as they are to hand.

The data covering these examinations are to be published in full through the official journal, and for this reason I have not weighted this letter with matters of detail.

It is interesting to note that investigations of the sorghum plant have been made by scientific men recently in other countries, and that prussic acid has been found in the plant. The investigators in those countries, however, do not appear to have attempted to decide the stage of growth at which the plant becomes safe to use; they have confined themselves so far to the recognition of the poison in the plant.

Investigations covering the examination of varieties of maize grown in Queensland, and also of green crops for feed and other manure purposes, which have been grown at the Mackay Station, will be fully set forth in later publications.

Addendum.

It has been omitted to state that the rather common belief amongst farmers that sorghum ratoons are more liable to be poisonous than plant sorghum is a mistake. The results of our work have shown in all cases that the young plant sorghum has contained more prussic acid than the ratoons of the same age.

DISCUSSION.

Mr. H. A. Tardent (Toowoomba) considered that both Dr. Maxwell and the Department of Agriculture were to be congratulated on the paper. At the Toowoomba Conference last year, several farmers who had experienced severe losses through feeding their cattle on sorghum, had expressed the opinion that the fatal results were caused by poison, but Mr. Quinnell had given a scientific demonstration, explaining that the stomach of the ruminant was so constituted that, even if there was poison in sorghum, it would not act on a cow so rapidly as to cause the sudden deaths that had been described by those who had suffered losses from sorghum feeding. Dr. Maxwell had now given an explanation of the trouble, which explanation would be satisfactory to farmers, and Mr. Tardent hoped that as Mr. Quinnell was there that morning, that gentleman would give an explanation of the two facts, and how he reconciled the constitution of the stomach of ruminants with the facts elicited in the laboratory by Dr. Maxwell.

Mr. R. Weedon (Nerang) had used sorghum without ever experiencing any bad results, and most of the cases where he had heard of such results had been where cattle had broken into sorghum while in a very hungry condition. He, for his part, would never turn hungry cattle on to sorghum. Many of them knew the effect of a good glass of beer on a well regulated stomach, and also its effect on a man who had missed his dinner. Feeding sorghum to cattle was a parallel instance. Hungry cows, that have been shut up all night, ought not to be let into a sorghum field, but he did not think any evil was likely to ensue in the case of cattle that had been in a big paddock all night. Keeping the cattle off the young sorghum would be found, in practice, hardly feasible. There is a weed growing in the scrub like a sweet potato vine, which sometimes attracts the attention of hungry cattle, and if they do eat it, it affects them very quickly. The speaker instanced the case of a neighbour of his who turned about forty head of cattle into a cultivation paddock where this weed was growing, and who, in a very short time, lost thirty animals out of the forty. There was no sorghum growing in that paddock, although the cattles' symptoms were exactly the same as those arising from sorghum-poisoning. Perhaps, in many cases, where cattle got access to sorghum with fatal results, they had also got access to this weed; and although he did not wish to say that sorghum was not poisonous, still it might not be responsible for all the deaths that were attributed to it. However, he thought that no man need be afraid of using sorghum, or grazing it off, if he used it in a proper state and let his cows get at it when they were not too hungry.

Mr. F. M. Murtagh (Nambour) was sorry Dr. Maxwell was not present, as the subject was a very important one; and, excellent though the paper undoubtedly was, the writer could probably have thrown more light on the subject had he been there personally that morning. He did not wish to go beyond the the question before them, but, as a sugar-grower, he could not help mentioning that he had never had the pleasure of meeting Dr. Maxwell. They had been told that morning that Dr. Maxwell had been investigating the pineapple disease, and now they had before them an article from his pen on sorghum-poisoning. The sugar-growers in the Nambour district, however, although they paid their little quota to his salary, and could not be in a more accessible position, had never met him in their own locality, but he hoped that at no very distant date this grievance would be a thing of the past. Mr. Murtagh had fed sorghum to cattle in all its stages, and had never noticed any injurious effects other than those to be expected from any green fodder, including maize.

Mr. W. BERLIN (Rosewood) was a farmer in the Rosewood district, and milked about thirty cows. He had put his cows quite hungry in the morning on to sorghum, and had left them there till 3 o'clock in the afternoon, with no ill effects. On other occasions he had put them on to sorghum, and in less than five minutes he had to go and attend to them. For his part, Mr. Berlin did not think they would ever get to the bottom of the problem as to when sorghum will affect cattle. He had grazed them on it, had cut it for them, had put them on it for two weeks, and nothing had resulted. Another day he would have half-a-dozen cows down in five minutes. Still, he had never lost an animal, and this he attributed to the use of baking soda, used at the rate of two tablespoonfuls to a pint of hot water. To apply this remedy, all that was necessary was to pour it down a cow's throat and then let her go quietly. This would cure a cow suffering from the effects of eating either sorghum or lucerne, and the latter he considered just as dangerous as sorghum. If they wanted to find out at what stage of its growth sorghum would not affect cattle they would have to look a long time, and there was only one thing to do for a man who put cattle on to sorghum, and that was to stand by and watch them. He had learned that, and while he was away from home the only sorghum his cattle got was that which was cut for them.

Mr. W. DEACON (Allora) thought Dr. Maxwell had got to the root of the question, for it was no use anyone saying sorghum was not poisonous. He himself had once thought the deaths complained of had been caused by hoven, but this apparently was not so, and, judging from the newspapers published in the countries where sorghum was used to any extent, the opinion was now pretty well unanimous that sorghum was poisonous. Mr. Deacon, after all, did not think that the facts elicited by Dr. Maxwell were contradictory to the propositions advanced on the subject by Mr. Quinnell at the Toowoomba Conference. Mr. Quinnell certainly described the action of an overloaded stomach, but he did not go so far as to say that if a cow took poison it would not be poisoned. If prussic acid went into the stomach of a cow or of a horse or a man it certainly would poison either of them.

Mr. J. E. DEAN (Maryborough) was with Dr. Maxwell in his statement that sorghum contained a poison, and instanced several cases where cattle had been put on sorghum and within five minutes had shown symptoms of poisoning. Of course, deaths sometimes occurred through cattle becoming hoven or blown, and that result was also obtained from green lucerne or any other green crop taken in large quantity or taken upon an empty stomach. He did not, however, believe there was any cause for thinking that sorghum was free from poison because cattle sometimes get blown on it. For this latter trouble the only remedy was to let the gas out as soon as possible by inserting a knife. In such cases the cattle almost invariably recover, and there are no symptoms of poisoning present. Mr. Dean had fed sorghum in every stage of its growth, and had never had any losses from it, although he had always first put it through the chaff-cutter. He had also used the wild sorghum without noticing any ill-effects. He had known neighbours of his to lose cattle through eating sorghum, but, in their cases, hoven had been the cause, and no remedy had been applied. Still, when there was no swelling visible, he was of opinion that the deaths were due to the action of a poison.

Mr. G. MARTIN, M.L.A. (Childers), had known instances of cattle dying from eating sorghum on the Richmond River. Dr. Maxwell had touched upon one plant, but the speaker thought that a great deal more depended upon the state of the cow when it had access to the plant containing the poison. If a cow were turned for five minutes on to sorghum and were then given some dry food she would suffer no ill effect, and the same would occur with a cow turned on to sorghum for a quarter of an hour every morning. Dr. Maxwell was to be thanked for directing people's attention to the danger involved in feeding sorghum to cattle, although there were other plants just as dangerous. A beast that had been affected by sorghum more than once would be found to come voluntarily forward for treatment.

Mr. E. Adams (Rockhampton) thought the thanks of the farming community generally should be accorded to Dr. Maxwell, for he had certainly solved a very serious problem. They now knew definitely by analysis that there was a poison in sorghum at certain stages of its growth. They also knew now that at a later stage this poison disappeared, and he therefore thought there was no occasion now for them to experiment with their cows as to the proper time to feed sorghum. It was one of the most valuable of fodder plants, but up to now a large number of farmers had been afraid to grow it, because they did not know at what stage of its growth it was fit to eat. This difficulty, however, had now, thanks to Dr. Maxwell, been removed.

Mr. Quinnell, M.R.C.V.S., in response to several calls, stated that in the address given by him at the last Conference he had simply reviewed what had been done in reference to sorghum in its scientific aspect. In that address he had said—

Sorghum, *botanically*, may be classed with the best of fodder plants. *Chemically*, it was in harmony with what was known of the chemistry of all fodder plants. Careful chemical analysis to isolate and identify poisonous matter had utterly failed. A poison that would kill a full-grown animal in ten to fifteen minutes must necessarily be present in relatively large proportions. Analysis had shown a trace of potassium nitrate, but *therapeutics* controvert its toxic influence. Culture made with the object of developing toxic bacteria gave negative results. The *entomologist* had declared specimens taken from patches where sorghum had produced fatal results to be free from insect or parasitical growths. *Physiologically*, it had been demonstrated that in the use of sorghum for pasturage the element of danger was not any greater than that to be found in indigestible fodder of any sort, and especially stale, or old, tough, green meal. *Pathologically*, it had proved its ill effects to be a derangement mechanically produced, and hence did not support the chemical theory of poisonous intoxication. Stockmen generally were agreed that hungry cattle should not be turned on to the sorghum pasture, even for a short time; therefore, the more enlightened dairy farmer should know that sorghum was not any more a stock-killer than the usual fodder plants were, if he will only adopt the precautionary measures that practical experience and science dictate.

Since that paper was written, hydrocyanic acid had been demonstrated, in the old country, to be present in sorghum, but it had not been demonstrated physiologically. From what he could learn, the proportion of hydrocyanic acid in sorghum was such that it would take 4 lb. of sorghum to poison an animal, that is, if it were taken on an empty stomach. He was quite satisfied now on the subject, the more so as hydrocyanic acid was the only poison that a ruminant could absorb. Deaths caused by sorghum-poisoning, where it was not caused by hoven, were due to two causes—the first, by absorption of the poison, and, secondly, his original deduction, by acute indigestion. The symptoms are identical, and the causes are the same. In acute indigestion a man might die by taking a mouthful of water. He takes it and falls down dead. There is no prussic acid in the water, but the shock to the stomach is so great that it affects the respiratory centre, and causes death by affecting the brain. The symptoms of hydrocyanic acid poisoning and its effects are identical with those of acute indigestion. He therefore considered that the necessity for precautionary measures, as mentioned by him last year, must still exist, and they are that an animal should not be allowed to get on to sorghum with an empty stomach.

Mr. A. Wagner (Nundah) said that, in his experience, sorghum, if fed to cattle in any great extent, ultimately affected the digestion of the animals.

The Chairman: I may point out that it is rather singular that when, at the Bundaberg Conference two years ago, this matter of deaths occurring among stock through eating sorghum came before us, no one seemed to have any definite opinion as to how the deaths arose. They only knew, broadly, that the cattle had eaten sorghum and that the cattle had died, and no one seemed able to give the information desired. Since that time investigations have taken place. Mr. Quinnell, in the then state of scientific knowledge, had attributed the deaths to mechanical disarrangement caused by acute indigestion—not to poison. Up to the time when Mr. Quinnell gave his opinion, it would appear that no poison had ever been found in sorghum by any scientific analyst. If any person up to then had attempted to extract a poison he had failed; but since then it has been discovered, not only in Queensland, but in America, in England, in the West Indies, and in other places that this poisonous element, which was not then known to exist, as a matter of fact does exist; and it was pointed out by Mr. Henry Tryon, of the Queensland Department of Agriculture, in October, 1902, I think, that a certain research work of the Scientific Department of the Imperial Institute afforded a solution to the vexed question of why cattle were sometimes poisoned by green sorghum. At that time, and for the first time apparently, it was discovered that green sorghum contained prussic acid. This discovery will enable a good many people to save their cattle from risks which they would otherwise run. I think it most satisfactory to find that a question, that was put to this Conference two years ago for an explanation, has now been afforded the explanation given by scientific researches. We find that the same question has been solved in the same manner in several different countries. A gentleman has to-day commented on the absence from this Conference of Dr. Maxwell. I do not concur with that gentleman that Dr. Maxwell ought to be here, or that he is to blame for not being here. Dr. Maxwell is engaged on a very important pursuit, for which he is primarily appointed and paid. He finds that his duties prevent him from coming here. He, however, gives us the benefit of his knowledge. When the question was first put as to what caused the deaths from eating sorghum, it was referred to Dr. Maxwell, because it was a question that could not be decided by mere guesswork. Dr. Maxwell undertook to make a scientific examination of the plant; he has done so successfully, and his results have been corroborated by scientists in other parts of the world. It is for him to decide whether it is convenient for him to come here or not. I feel certain that had Dr. Maxwell been able to come here without neglecting his primary duties, he would have been present. But, although he has not come, he has provided us with a very valuable paper. I think he has done a great service to all agriculturists, and, instead of finding fault with him, I think we ought to express the appreciation which we all feel with regard to his valuable services. I think the discussion has been a very valuable one, and that we have got a great deal of information from the practical experience of the delegates present.

The next paper was by Mr. H. A. TARDENT, and was as follows:—

SOME DESIRABLE IMPROVEMENTS IN THE CULTIVATION AND UTILISATION OF THE MAIZE CROP.

[By HENRY A. TARDENT, representing the Drayton and Toowoomba Agricultural and Horticultural Society.]

It is not intended in these brief notes to go into the whole subject of maize-growing, but only to draw attention to a few points where our present methods might advantageously be improved upon. Maize is too well known to every Queensland farmer to need any description. We are also all aware that it does best on deep well-drained loamy soils, such as are to be found on our river flats and on the volcanic soils of our scrub lands. With good and thorough cultivation it does also very well on most of our forest lands and on other soils which at first sight appear rather unsuitable for it.

The nimblest among men had to crawl before they could walk; in like manner the pioneer maize-grower has, per force of circumstances, to grow the first few crops on a just-cleared scrub by very primitive means indeed. But even here human ingenuity has come to his rescue. There are on the market cheap hand corn-planters which save both backache and seeds, and do the work efficiently in half the time it takes with the traditional hoe.

But as soon as the land is clear of stumps and stones, and is in what I would call full growing order, we should try and go in for the improved implements and methods which have made our American cousins well-to-do farmers and the foremost maize-growers in the world. Where individual efforts and individual purses are not equal to the task, let farmers co-operate, and they will in a few years reap the full benefit of their wisdom and enterprise. Nobody would think nowadays of harvesting a field of wheat with the traditional reaping-hook. Where the harvesting used to take weeks and scores of men with that practical but mighty slow implement, it is now done in a few days by one man only, sitting comfortably on a reaper and binder or on a stripper. Why should not maize-growers not follow such examples and take full advantage of the splendid mechanical contrivance devised for their benefit by human science and ingenuity?

First of all, we should work the soil more thoroughly than we usually do at present. I am well aware that in very good seasons good crops are occasionally harvested on badly-worked soils. But we all know that such perfect seasons are exceptions. Our climate is noted for its extremes of dry and wet seasons, and we should be prepared for both. Fortunately the remedy lies in our own hands, and, by a stroke of good luck, it is the same for both the wet and the dry seasons. It consists in working the soil deep or rather in subsoiling. It is all very well to talk of irrigation. I am myself a great believer in it wherever it is practicable. But for many years to come it will be available only for a trifling part of our agricultural area, whilst subsoiling has nearly all the advantages of irrigation without any of its drawbacks, and it can be applied throughout the length and breadth of the whole State, and to nearly all soils except, of course, those situated on steep declivities where there is danger of the soil being washed away by occasional heavy rains.

When properly tackled, subsoiling is easy enough. It is neither so expensive nor so cumbersome as it used to be in the olden days, when it was done by means of a huge clumsy subsoiler following the plough, and drawn by a whole team of horses and by the combined exertions and expletives of two or three men.

Nowadays the operation is much simpler and cheaper. If you can afford it, buy a double-furrow subsoiling plough, such as are being manufactured by Australian makers. In those implements the near side foot is like in ordinary ploughs, whilst the off side consists of a specially-shaped foot with an ox-tongue-shaped shear, which breaks up and stirs the subsoil at the bottom of the furrow without bringing it to the surface. Should you meet a stone or root, an ingenious lever enables you to lift the foot altogether, and to drop it again when the obstacle is passed. That special subsoiling device is adaptable to most double-furrowed ploughs, and costs, I am informed, from £5 to £10. If you cannot yet procure one, then turn your own double-furrow plough into a subsoiler (as I did myself on one of the State farms) by getting your local blacksmith to make you a simple adaptable subsoiling foot, and fix it on your plough by means of an ordinary clamp.

By these simple means one man with three or four horses, according to the stiffness of the soil, can plough and subsoil in one operation from half to one acre of land a day. It saves 50 per cent. in horseflesh, labour, and expletives, and the work is done considerably better than by the old methods, as the horses never tramp the subsoiled furrow. This leaves the soil as porous as foam on the milking pail, and consequently opened to the all-beneficent influences of atmospheric gases and rain. Subsoiling will largely increase the producing capability of your soil. It will allow the roots of the plants to go further and deeper in search of food. It will act as a drain in wet weather and as a store of moisture in dry seasons, and make you in a large measure independent of the weather variations. Have recourse to subsoiling not only for the maize crop, but for your vegetable garden, for your orchard, for your lucerne, cowpea, and paspalum paddocks, &c.

A long practice has so thoroughly convinced me of the great advantages of subsoiling for most crops that I would like to see the Australian farmers as well as all Australian miners adopt for their motto the last word written on the bark of a tree by one of their famous explorers—DIG!

After the land has been for a few weeks exposed to the action of the various atmospheric agents, pulverise it thoroughly by means of the best procurable scufflers and harrows. The best I have found for that kind of work are spring-tooth harrows, which not only pulverise the soil well, but also shake clean all the weeds, including couch grass, and cause them to wither and die on the surface of the field.

For planting, mark first your rows, usually four at a time, by means of a simple home-made corn-marker; then use, if possible, one of the numerous corn-planters now on the market. They save seeds, they save time and labour, and do a much better work than can be done in any other way. With them no moisture is lost by evaporation, as is the case when we open drills with the plough; all the seeds are sown at the same depth and firmly imbedded in the soil, which causes them to come up all on the same day. These two circumstances alone justify the use of the corn-planter. As you are well aware, the seeds which come up a few days after the main crop never overtake the others, and result is a dead loss.

For after cultivation, I know of nothing equal to a careful and thorough harrowing by means of lever harrows with the teeth slightly slanting backwards. If the work is properly done by a careful man, not one plant in a thousand will be injured, whilst all will be greatly benefited. The pulverising of the soil quite close to the young stem will go a long way towards facilitating the expansion of the roots and preventing the evaporation of moisture through any other channel except the roots, stems, and leaves of the plants, which mean, of course, active circulation of the sap and quick, vigorous growth. In fact, to my mind, harrowing acts on the field and crops like a thorough grooming on a horse. It quickens the circulation, and supplements feeding. Later on use the best scarifiers you can afford, such as can both destroy the weeds and keep the soil well stirred and pulverised. The first scarifying should be deeper, and the subsequent one gradually shallower, so as not to injure the lateral roots which the plants project horizontally at a shallow depth in every direction.

The old plan of hilling up the corn with the plough should be resorted to only when weeds have taken the upper hand and are too much for the scarifier, or when the season or situation of the land is such as to imperatively require some provision for surface drainage.

If it be intended to grow a crop of pumpkins in conjunction with maize, which in many cases is an excellent plan, I always prefer to give the pumpkins a row all to themselves—say, every fifth or seventh row with from four to six rows of maize between them. Such a plan allows of a better and longer cultivation of soil, and of a more intense circulation of light and air through the crop, which more than compensate for the loss of one row of maize.

But it is especially in the harvesting of the crop that we are behind times. It is yet mostly done by hand, which is slow, tedious, expensive, and altogether obsolete; and, strange to say, after we have gone to much trouble and expense to grow a crop, we content ourselves with harvesting only part of it, allowing the other part—namely, the stalks—to go to waste. Now, chemical analyses as well as practical experience have demonstrated beyond contestation that these neglected stalks contain nearly as much feeding value as the grain itself. By using one of the maize-harvesters now in the Australian market, the whole of the crop can be saved, exactly as is now being done with the wheat crop. The corn-harvester is to the maize-grower what the reaper and binder is to the wheat-grower. It cuts the stalks close to the ground, and delivers them in tied sheaves or bundles, which are then stacked and allowed to get cured and dried in the field.

Should you find, with some Yankees, that there is yet too much bother attached to the gathering and stacking of these tied sheaves, then don't grumble any more; go in straight for a shocker. It will not only cut the stalks, but will also build up the stook on a small platform, tie it firmly, so that the man driving the implement has only to drop it gently on the ground by means of an ingenious tiny crane. I am not aware of the shocker having yet reached the Australian market. American farmers speak in glowing terms of its good points as a labour-saving implement.

Personally, I am inclined to think that those machine-built stooks will have a too narrow basis, and be then liable to be upset by the strong winds sweeping at times over our fields. Anyhow, the shocker is well worth a trial, and the Department of Agriculture could do worse than importing one or two, which could be tried at the College or on the State Farm, so that farmers could see whether they suit our circumstances or not. Whichever way the harvesting has been done in the field, once the stuff is dry and cured it has to be carted to the barn. For that purpose I beg to suggest that the high-wheeled and narrow-tired dray be gradually replaced by lower four-wheeled vehicles of the American wagon type, which have broader tires, are of easy draft, are less injurious to the soil, and are so easily loaded and unloaded.

If we cannot do otherwise, the cobs can now be taken off by hand and the stalks passed through the chaff-cutter; but as soon as possible we should go in for a corn-shredder. From personal experience I should say that the corn-shredder is, like the pig, the most gluttonous inhabitant of the farm, but at the same time the most profitable. Its mouth or hopper reminds one of the two formidable jaws of the crocodile. It positively devours all that you throw into it. To me it is a perfect pleasure to see armful after armful of well-dried cornstalks with their hard, fibrous crusts, cobs, leaves, and all enter the hopper—to come out, the cobs husked and shelled, with the grain clean and ready for the market, and the stalks shredded like wool, divided into light pieces, which a rapidly revolving fan blows through a long pipe straight on the stack or into the barn. When mixed with lucerne or cowpea chaff, with bran or molasses, that shredded stuff forms a most valuable standby for the bleak winter months.

Another aspect of the maize crop which to my mind is not yet sufficiently recognised is its very great value as feed for cattle, either green, straight away from field, or cured for hay, or, still better, when used under the form of ensilage.

During the last drought, when our cattle were perishing in thousands, we have allowed many millions of tons of valuable corn to go to waste for want of knowing the value of ensilage, or, also in many instances, the methods of making it properly. There is, however, nothing very difficult in the process. Like most other works on the farm it requires to be done carefully and thoroughly, or it will result in failure and loss. But once the principles of fermentation are mastered the whole thing becomes as easy as the making of butter, cheese, or wine, which are also the results of certain fermenting processes. The whole secret consists in submitting the green stuff to fermentation, by excluding the possibility of its becoming subsequently mouldy or rotten.

If your means will allow you to do so, it will well repay you to build, in a handy, well-drained place, a true silo, either by excavating a pit into the side of a hill or by erecting your building over ground, or by a combination of both. To get the proper size, take into consideration that a cubic foot contains approximately from 40 lb. to 45 lb. of well-set ensilage. Fifty cubic feet will, then, hold about a ton. The cost will, of course, vary with the price of labour, the hardness of the soil, the proximity or otherwise of building material, &c. But it is usually reckoned that an excavated pit comes to about 2s. per ton capacity, and a wooden silo from 5s. to 10s. per ton capacity. There are now conical silos, shaped like huge wine-fermenting vats, which are both fairly cheap and efficient, and greatly appreciated by American farmers.

But, should you be unable yet to afford the expense of any kind of silo, that is not a reason why you should get discouraged and renounce the benefit of ensilage feeding. Go in simply for an ensilage stack. There will be a little more waste, but the ensilage proper will be every bit as good as in the best of silos. Build up the foundation with strong gravel, logs, twigs—anything which will keep the stuff from coming into direct contact with the ground; a circumstance which would infallibly result in mouldiness and rottenness.

Pack tightly, being careful to have always the butt ends of the stalks outwards, and the leafy tops inwards, towards the centre. Do not keep the centre higher, as in ordinary wheat or lucerne stacks. A second of reflection will tell you why. When the stack is from 3 feet to 4 feet high, it is well, if time permits, to let it settle a bit before continuing. Do not allow yourself to be disturbed in your work by a bit of wet; a few showers will only do good. In fact, the best weather for ensilage-making is a covered, misty day, intermixed with light showers.

Put the stuff in as green and fresh as possible. Most of the failures in ensilage-making are due to the use of withered and too dry stuff, which results in nasty mouldiness. When the stack is finished, keep it pressed down, either by wire ropes tightened with Spanish windlasses playing on both sides of the stack or by loading the stack with earth, stones, logs, or anything heavy. If you are of an inquisitive turn of mind you can easily watch the temperature of your stack by providing, at the time of building it up, a $1\frac{1}{2}$-inch iron pipe reaching the middle of it, and by occasionally dropping a thermometer into it held by a string or a piece of wire. I can assure you that it will interest you, and every one on the farm, to watch the temperature gradually rise until it has reached a maximum and then gradually get lower, until after three or four months the temperature of the stack becomes equal with that of the outside air. The ensilage is then ready for use. The marvellous tiny helpers a bounteous Nature has provided us with have accomplished their useful work. To do it properly, they want, like all other living organisms, circumstances favourable to their development and multiplication. It is here where the temperature plays an important part. At from 100 to 125 degrees Fahr., the variety of micro-organisms at work produces so-called sour ensilage, something like the buteric or lactic fermentation of milk. At from 130 to 150 degrees sweet ensilage is produced, which is much more like the vinous fermentation of grapes and some other fruits. It is undoubtedly the best. The colour is of a beautiful light or dark brown, and the smell reminds one of honey, or at times, of preserved French prunes. If the temperature goes much higher, say from 170 to 180 degrees, the colour of the ensilage is much too dark, reminding one of black felt; it easily rots, and is not taken to kindly by the farm animals. You can easily regulate the temperature by means of the pressure on your stack. If you remember that the oxygen of the air is necessary to the life of the fermenting organism, you will conclude that by increasing the pressure you diminish the oxygen, slacken the production of micro-organisms, and consequently lower the temperature produced by the teeming millions of those tiny lives.

But, fascinating as it is, I will not go just now into the scientific aspect of ensilage-making. I prefer to give one or two more practical hints.

When the stack gets a bit high I found it very economical to have a strong high post erected with a pulley on top, by means of which a boy leading a quiet horse lifts the stuff in an efficient and cheap manner. Should this means prove inconvenient, then it is well to have a temporary platform erected at middle height on one side of the stack. On top of the ensilage stack I usually pile up old cornstalks, dried weeds, straw, or anything which will keep off the rain, until the whole mass has had time to settle down, when it is as tightly compressed as a cake of tobacco and practically impervious to rain.

I have often been asked what should be the dimensions of an ensilage stack. Of course you understand that the larger the stack the less will be the proportionate waste round it. For a 20-ton stack 8 feet by 8 feet is a fairly good proportion; 10 feet by 12 feet for 40 tons; 12 feet by 14 feet for 80 tons; 14 feet by 16 feet for 100 tons. For small quantities I much prefer a shape largely used in my native country. Instead of being square the stack has the shape of a claret bottle, and is built round a strong post fixed firmly in the ground; it is easier built, and there is less waste.

The more I see of and learn about the circumstances we are in in this State, the deeper gets anchored in my mind the conviction that dairying should be made, throughout the greater part of Queensland, the foundation of our rural husbandry. To make it a success, however, we want the best breeds of cows; we must bestow on them the most attentive care; grow for them and preserve artificial feed and grasses. Then, as with charity, all other things shall be given unto us. And amongst these other things none will, perhaps, occupy a larger and more useful place than maize, that grand and noble cereal, to which we give the sacred name of *corn*, reserved in most other countries to the exclusive designation of wheat. We possess the climate and immense tracts of country unsurpassed in the world for the production of high-class maize. The experts of the southern States have invariably declared our maize to be of superior quality. The late emigration lecturer, Mr. Randall, stated in an official report that nothing had ever been seen better in Great Britain than the samples of maize which I had the honour to grow and prepare for him at the Westbrook State Farm, in the very heart of the Darling Downs. These experts' opinions are now confirmed by science itself. The careful analyses made in the Department of Agriculture by the most competent and best qualified of men have proved that the feeding value of our maize is by from 10 to 15 per cent. superior to that of the best foreign varieties, such as those which were exhibited from all maize-producing countries at the Chicago World's Fair. It rests now with ourselves to bring our methods up to date and to make the best of the magnificent opportunities offered to us by a bounteous Providence. I firmly believe that we shall prove equal to the task. I have faith in our people. In this, as in many other things, we shall conquer the first place and maintain ourselves in it against all-comers. *Dixi!*

DISCUSSION.

Mr. R. WEEDON (Nerang) admitted that, in describing the agricultural implements used in the cultivation of maize, Mr. Tardent had done so very ably; but still there were a few other tools that might also be referred to. The advances that had taken place in the construction of ploughs had probably done more than anything else to revolutionise agriculture, and few implements had taken a greater part in that revolution than the disc-plough. The first ones introduced were—like all new machinery—heavy and clumsy; but since then they had been so much improved that no one should now hesitate to use them. He knew that some who had purchased the first heavy ploughs had regretted it; but using the later models was as different from ordinary ploughing as ploughing was from digging. The latest thing in disc-ploughs was the Benicia reversible plough. This plough remains in the furrow, and the horses turn and take the beam round without any labour. The driver sits still on his seat, the disc itself turning. A girl of twelve years old can drive the plough, or, rather, all she would have to do would be to drive the horses, for the plough itself requires no handling. Two horses are sufficient for a one-disc plough. The beam is very short, and the whole machine is very compact. The Osborne Company import them, and they cost in Brisbane £17 10s. the single disc. Mr. Weedon did not wish to say anything about the gang-plough; but he was not in a position to use such an implement. He spoke from a medium farmer's point of view, and he thought a man would be better off with two disc-ploughs than with a gang-plough; for with the latter a horse knocked itself about in turning, and quicker work could be accomplished with two disc-ploughs than with a gang-plough. There was no blacksmithing work necessary in connection with the former implement, and new discs could be obtained for 15s. each. Mr. Tardent suggested in his paper the use of American wagons; but Mr. Weedon thought the old-fashioned tip-dray and a suitable barn—that is, one built on the side of a ridge—would be handier. In his district people tried to build their barns so that the drays could be backed in and the stuff tipped in through a shoot. By adopting that means they were able to dispense with elevators. An implement not mentioned in the paper read was the disc-harrow; but, in the opinion of the speaker, anyone who had once gone in for a disc-harrow would never use any other form of cultivator. With a disc-harrow a man could go on to his land at any time. With the best of cultivators clogging always took place, but with the disc-harrow there was never any such trouble. Certainly anyone going in largely for corn should invest in a disc-harrow.

Mr. J. T. Pike (Brooyar) advocated the reduction of railway freights on agricultural implements and machinery. He also gave several instances of the efficacy of deep as compared with shallow cultivation, and alluded to the recent destruction by fire of a silo at the Agricultural College.

Mr. W. S. Palmer (Bowen) asked whether it would be better to mix natural grasses with maize in the making of ensilage, or to make it of maize only. It had been stated by some that if natural grasses were mixed with maize the manufactured ensilage would be better for the digestion of the animals that consumed it. He wished to know whether Mr. Tardent had had any practical experience on that point.

Mr. Atkinson (Danderoo) described in detail his experience in the manufacture of stack ensilage, and referred to the difficulty he had in procuring reliable information to assist him in the erection of his first silo. When he started he had not enough money to build an ensilage building, so he determined to make a stack do, although he was warned by many of his friends, who in their attempts had generally made dung instead of silage, that he would never succeed. He planted for his purpose a large variety of corn, and did not cut it until the cobs were well on it. He carted it from the field as quickly as he could with the assistance of two drays, and although he had not far to carry it, it took eight days to build the stack, which in the end probably contained about 60 tons of stuff. He put logs at the bottom, and made all arrangements for wires for tightening purposes, &c.; but, as the erection of the silo proceeded, he became convinced that he would have no use for the wires, and in fact he now believed that there was no need for any outside pressure at all. When a stack settles down, it settles down considerably, and he disagreed with Mr. Tardent in the matter of crossing the bundles. Where his stack went down was at the edges; it kept round at the top, and the rain ran off it like off a roof. He did not put either stones or earth upon it, but simply finished it off at the top. He built it up about 23 feet high when he was finished, but it settled down to about 16 feet. A short while ago he started to feed it by taking the fence down and letting the cows and horses at it, and he could assure those present that it was relished by all the stock that had access to it. The horses kept fat on it, although they were being kept constantly in work. In the erection of the stack, he put the butt ends outwards and lapped the other bundles over that. In a stack of ensilage there was probably from

10 to 15 per cent. waste, but it would always have to be calculated upon, as it was difficult to say how it could be prevented. In his paper, Mr Tardent had alluded to the difference between sweet and sour ensilage, but, in his stack, Mr. Atkinson had found nothing but the extreme ends in any way black, while towards the centre the silage was a nice light-brown colour. Towards the bottom it commenced to get greener as he went down, and he found the stock liked it better as he went in that direction. He believed "sour" and "sweet" were terms to describe different classes of ensilage—that was, one was sour and the other was sweet, but that the amount of sugar in the silage did not vary with the kind. Later in the Conference, Mr. Atkinson exhibited a sample of ensilage which he had brought from his stack at Danderoo.

Mr. A. Wagner (Nundah) believed in maize as a fodder for cattle, and many of his neighbours who had hitherto depended chiefly on sweet potatoes were going in more and more for maize. As he had already mentioned that morning, he had known the digestions of both cattle and horses impaired by being continuously fed on sorghum, but that was a trouble that was never experienced in the use of maize.

Mr. Deacon (Allora) had been very successful in the erection of an ensilage stack which he had built of maize, cut when the grain was in the milk stage, but not cut too closely, for the stalks were left 6 inches in the ground. On the top of the maize he put a lot of green lucerne, and he was of opinion that it would always be a good plan for a man to make the base of his stack with maize and then put green lucerne on top of that. The advantage of the stack in ensilage-making was that a lot of cartage was done away with, for the stack could be erected right in the middle of the field from which its constituents were to be taken. Three or four acres of corn would make a very decent stack, and if the maize was grown on purpose for ensilage, a quickly-growing variety should be selected, and the seed should be planted thickly. He was doubtful whether there was much necessity for the use of weights in the making of a stack silo. He had used them, but was a bit sceptical as to their utility. He did not think much of Hungarian millet as an ensilage plant. In conclusion, he was a bit doubtful whether Mr. Atkinson's ensilage was not really hay, for genuine maize ensilage should be as brown as a berry or as black as a crow.

Mr. E. Adams (Rockhampton) had grown both maize and sorghum for ensilage which he had made in a wooden silo. Unfortunately, he had built his silo before the articles on the subject had appeared in the *Agricultural Journal*,* and he hardly built it strong enough, but still he managed to make very fair silage. He had 3 or 4 acres of sorghum; this he chaffed and elevated into silo, and then on top of that he put a lot of maize. When feeding the stuff he found a lot of waste at the corners, but the rest of the silage was of a nice golden-brown colour. When he came down to the sorghum which he thought, owing to the greater pressure, would be of better quality still, he found the stuff quite black, and although it had a nice smell the stock would not take to it. He tried to starve the stock into acquiring a taste for it, but without success. Several of his neighbours had also tried sorghum in ensilage-making, but had failed. Maize, on the other hand, made fine ensilage, provided it was chaffed, and he considered that the silo was an excellent means of storing forage. With a stack silo there was from 15 to 20 per cent. of waste, and that was too much.

Mr. Deacon: You do not lose that. You should not lose more than 5 per cent.

Mr. Adams: I have lost in a wooden silo a space of nearly a foot.

Mr. McLean: You did not pack it perfectly.

Mr. Adams: It was good on top, and only bad at the corners. But if it is bad in a silo, what would be the loss in a stack? It would pay anyone going in

* Full instructions how to build an oblong and a tub silo were given in this *Journal* in April, 1898. Mr. Thynne's article also appeared in 1898.—Ed. *Q.A.J.*

for ensilage to have a shed in preference to a stack? Anyone going in for ensilage should read the article on the subject by Mr. Thynne that appeared in the *Agricultural Journal* about two years ago.

Mr. McLean: The question of the pit silo has been pretty well settled, but the question of the stack silo has not, and there is a good deal yet to be learned in connection with it. It would be as well for everyone to realise that such is the case, for the questions of the utility of stack silos and of the building of them are still open ones. There is also the question of whether they should be weighted or not, and it appears that recent developments are in favour of doing away with the weighting of stack silos. A great deal, however, depends upon the condition of the stuff used in the erection of a stack silo, but still on other points there is yet a good deal to be learned, and we should not make up our minds on them until the whole question has been threshed out.

Mr. J. E. Dean (Maryborough): I have had a good deal of experience in the feeding of maize to dairy cows, and, now that the drought has passed, people are beginning to realise that they must treat the few cattle they have left in a very different manner to formerly, and the question has arisen, what is the very best green food? To them I should say, there is not a better than green maize, and I have fed it now for the past six or seven years, trying it in conjunction with all other feeds. As for lucerne, I prefer to make that into hay and use it in times of scarcity. We can put in maize now for green food, and my method is to sow it in drills, planting it in every furrow, as in that way it stands the dry weather best. Or it can be sown broadcast, but in broadcast sowing you do not get such a good crop in dry weather. There is not a food that can be grown and used to such advantage as maize. For nine months you can cut it for cows, although I would not advise people to cut it too early. You can cut it up till June, and it is only just now that I have finished a piece I had of it. Occasionally risking the frost, I have cut it right through. When maize ceases to be of value, I cannot say, but I know that I have used with advantage the stalks when they were quite hard and flinty. If you put them through the chaffcutter you will get a splendid food for your cows. (Mr. Tardent: Especially if you steam them.)

Mr. Tardent (Toowoomba) said he had no personal experience of the disc plough, but from what he had seen of it he thought it was an implement that has an immense future before it. As for the American wagon, those who were going to Biggenden on Friday would see one with a platform on top of it like a kind of lorry. He also said: I wish the Minister for Railways were here to-day, so that he could have heard Mr. Pike's remarks on the subject of the heavy railway freights on agricultural machinery. As to the same gentleman's remark about the spontaneous combustion of the Gatton silo, I must admit that when I read of it I did not believe it. Spontaneous combustion is like the rats in a house which are blamed for a fire when no other explanation is handy. There will be no spontaneous combustion unless you mix dry and green stuff together. Automatic combustion might arise then, but any ensilage that has been properly made of green material should not take fire of itself. It is correct that there is from 10 to 15 per cent. of waste round an ensilage stack, although about 10 per cent. should be the limit. If you have a large stack, of course, the proportion of waste will be less than it would be in the case of a small one. At the same time if you have a crop of maize, and turn it into hay, you will have to use 5 or 6 tons of greenstuff to make a couple of tons of hay, whereas if you turn it into ensilage, you practically have as many tons of ensilage as you have of greenstuff, so you have a bit of margin for your waste. When it comes to feeding, you require from 40 to 50 lb. to feed a cow, with ensilage you have the same quantity, so it will be seen that three or four times more cows can be fed with a crop turned into ensilage than if it had been turned into hay. Ensilage comes in handy in winter when the native grasses are dry; for if, in addition to the dry natural grasses, you feed a small ration of juicy ensilage instead of a dry hay you will improve the cow's digestion and enable her better to assimilate the dry natural grasses. As for the different kinds of ensilage, it may be said that "sour" ensilage is produced by the microbe which gives the lactic fermentation. I always prefer ensilage with a good, vinous smell, and the cows also seem to like it better. I agree with the contention that the principal cause of failure in ensilage-making is, using the stuff when it is too dry. If your cornstalks are too dry, you had better cure them in stooks, and make hay of them. If you wish to make ensilage, the time to get the maize is when the grain is in the milky stage. If you put your crop into a silo stack and feed it out to your cows, you will get a surer and better market than if you sent hay to market and only get a few shillings for it. As for the waste in the corner of a silo, it must be remembered that when the silo stack is being filled it is very easy to make dead work of it if you are not careful. The stuff has a propensity to fall in the centre, and, consequently, the air has access to the corner, and causes mouldiness. An excellent plan is, when the stuff is falling, to have a kind of funnel with which to distribute the stuff, and to have a man to trample round the corners. If this is done, there will be no waste in a well-filled silo. I do not believe in broadcast sowing for maize. You can sow it slightly closer than for an ordinary crop, but do not sow it broadcast. You cramp your crop, and you run a big risk if dry weather comes along. Your maize, moreover, will never have the same feeding value of maize which has had an opportunity of getting access to the air.

The CHAIRMAN: There are two or three matters which have been referred to by some of the speakers which I may, perhaps, be permitted to remark upon, and these include the matters of the railway freight on agricultural machinery and of the fire at the Gatton College. Before I do so I shall take the opportunity of saying that a very obvious principle lies at the bottom of the paper read by Mr. Tardent, and it is this: That in order to ensure the full development of all organisms, food is necessary. The first part of Mr. Tardent's paper referred to deep cultivation. Deep cultivation has an object, and that is, to set free the elements of plant life, which otherwise the plant could not obtain. The second part of Mr Tardent's paper has reference to silos. If we want the proper development of animals, in order to render them fit for killing for table purposes, or in order to produce milk, then feeding must be provided, so that at the bottom it is merely a statement of a fundamental truth, that if you want to get the best out of living things, then the living things must be fed. That is a truth that has been emphasised for some time with great force by Dr. Maxwell. With regard to freight on agricultural machinery, a question that Mr. Pike has alluded to, it must be borne in mind that the cost of machinery, which is so important to the farmer, is arrived at by certain causes. We will say that there is the value of the machine to make. There is the added cost generally owing to the imposition of duty for protective purposes. The farmer has to pay that. That is a matter for which the Commonwealth Parliament is entirely responsible. Then there is the expense of taking the machine to Queensland. Undoubtedly it would be desirable, in order generally to encourage production in the colony, to have the freight charges on agricultural machinery down to the lowest possible limit, and with regard to this matter I may say that, although Mr. Leahy is not here to-day, he will hear or read what has been urged on the subject by Mr. Pike, and I shall be very glad indeed to bring the matter before him. But you must remember that the Government, like the farmer, must get enough to exist on, and that the bad times and other causes have prevented the Treasurer's getting enough even to pay all yearly expenses. I am quite sure that the railway freights never would have been increased except there had been great urgency, and to prevent something else, and that is, the inability of the Government to pay its way. Strong cases may require strong remedies, but I am quite sure the Government would have every sympathy in the question of diminishing the cost to our farmers of machinery which is reproductive, and which is of so much value in the progress and prosperity of the country. If, therefore, Mr. Leahy is unable to reduce the railway freight on agricultural machinery, it is simply because the finances of the country prevent him doing what he otherwise would be only too glad to do. With regard to the fire at Gatton, I may say that Mr. McLean would have made an inquiry into the cause of that unfortunate occurrence, but his time has been taken up and is taken up at present, by other duties. But Mr. McLean will hold an inquiry into the origin of the fire because, for several reasons, if it is established that a silo is liable to catch fire from spontaneous combustion, it is really a very serious matter, and I shall be very loth to accept that theory unless there is very conclusive evidence for it. I do not know whether there was a case in which it is supposed that a silo, which is essentially damp (it must be damp, otherwise the fermentation cannot take place), could take fire from spontaneous combustion. Someone expressed a desire to know whether the mixing of natural grasses with maize would improve ensilage. That matter I shall refer to the best authorities. The Agricultural Adviser may make inquiries, and Dr. Maxwell will doubtless gladly make similar inquiries. The knowledge thus gained will be given in the *Agricultural Journal*. We have all heard to-day an illustration of the truth that doctors differ, and that has been in connection with the arrangement of silos, and so on. That is probably a good thing, because it shows that the members of the Conference bring open minds to the facts with which they have to deal; that they are observant, and that they form opinions for themselves. But I think it would be a good thing that the members of the Conference—than whom there are no persons more competent—should not only take notice of the best results how they are obtained, but formally record their observations, with dates, periods, atmospheric conditions, and so on. And if a few of the farmers, whose business it is to attend to these matters, would only record their experiences, as a sailor records his experiences in a log, I am quite sure that the comparison of different experiences would be very valuable, and would, in fact, supply useful data even to men such as Mr. Tardent and others, who might consider themselves experts. They would be exceedingly glad if they had, in tabulated form, experiences which the farmers of this Conference might very readily obtain.

THE ADVISABILITY OF GROWING COTTON IN THE CENTRAL DISTRICT AS A STAPLE CROP.

Mr. G. N. TERRY (Stanwell): Although I claim to have five years' experience of the farming industry, the last three have practically been years of drought, and it is not my intention, in introducing this subject, to give any practical experiences of my own with regard to cotton-growing, nor does the society that sent me here expect me to do so. What my society wishes me to do is simply to introduce the subject and try to obtain an answer to the most important question in farming, or in any other business, and that is—Will it pay? I shall be glad if any of the delegates here have any knowledge of cotton-growing, if they will give it to us. I shall listen very carefully to the remarks that are made by anyone who has had any experience on the subject. We have considered the subject these last few months very seriously, and the only information that we have been able to glean is that given in Hockings' Manual. That was written a long time ago and possibly the conditions that existed then do not exist now. It is possible that the delegates present might be able to throw out some valuable information which will lead us to seriously consider whether we shall grow cotton in the Central district or not. It is apparent to us that the existing crop does not pay. We want to know whether we can better our condition, and will cotton do it? That is the whole sum and substance of what we want to know, and if I talked an hour I could not explain it in a better way.

Mr. F. W. PEEK (Chamber of Agriculture): I would like to say a few words upon this matter, and might say, first of all, that it is a question that has occupied the council of the Queensland Chamber of Agriculture. I received a communication lately from Cairns, where Dr. Thomatis has been giving a little attention to cotton-growing, on a small scale, in the way of producing, or trying to develop, a better quality of staple, and a sample of the cotton he had produced was placed upon the table of the chamber at their last meeting. But in my opinion the class of cotton that I have seen grown at the Acclimatisation Society's Gardens in Brisbane is superior to the sample sent to us from Cairns. With regard to what Mr. Terry has said, I can inform this Conference that cotton-growing is now being taken up in various parts of this State as a coming crop again. It was started some years ago on the Logan, and on my making inquiries among the old settlers as to why it went back, I was told it was the cost of the labour involved in picking, the low price offered at that time for the staple, and the absence of facilities for export. To-day we are under different conditions. We have cheaper freights, and we have the knowledge that at the present time there is a cotton famine in America which is turning the eyes of the world, and more particularly those of the Manchester manufacturers, to the development of cotton-growing in other sections of the world. The sample of cotton submitted by Dr. Thomatis to my chamber in an open competition gained 75 points out of 100, which was practically 17 more than any other cotton submitted, and yet I feel certain I have seen better samples growing at the Acclimatisation Society's Gardens. I think this cotton of Dr. Thomatis' is a cross of a Mexican variety on the Sea Island. As a crop, with the present facilities for growing, I am of opinion that cotton-growing would prove a paying crop in certain parts of the State. We know cotton does not require so much in the way of cultivation as other crops. Furthermore, there is larger development in the direction of manufacture, in the way of the extraction of the seed, which widens the avenue for the profitable disposal of a crop. The removal of interstate barriers should also greatly assist us should we again enter largely upon the production of cotton in Queensland I believe cotton is worth 5½d.* per lb. to-day, and at that price I think it would pay Queensland growers to go in for it. As for information on the subject of the cultivation of cotton, I would refer Mr. Terry to the articles on cotton by Mr. D. Jones that have appeared in the *Queensland Agricultural Journal*.

Mr. W. G. WINNET (Beenleigh): As is doubtless known, cotton was once grown in our district to a very considerable extent, and at that time the seeds were a waste product. The seed now forms a valuable item in the production of cotton, and, if the cultivation of the staple is again entered upon in Queensland, the present growers will have at least that advantage over those who grew it in former times. Personally, I have received a lot of information on the subject of cotton from reading Mr. Jones's articles on the subject in the *Agricultural Journal*.

Mr. W. FIELDING (Redland Bay): About five years ago I planted a fairly large piece of land with cotton, and got a splendid cotton, but on the coast the trouble is there is too much rain. The Central district, however, being not so much subject to rain, should be specially adapted to cotton.

Mr. SMITH: Cotton grows easily in all kinds of soil; in fact, I find it grows as readily as prickly pear or Bathurst burr. I use the cotton I grow for making pillows, beds, &c., and find it comes in very useful.

Mr. S. L. JONES (Roma): Out our way our principal crop is wheat, but it is a very poor crop, and if there was a bit of money in cotton, it would be a great thing for us. But the great thing with cotton, and in fact with all things, is, Will it pay? I remember the time when cotton was grown down at Ipswich. It grew right enough, but from the time it is planted to the time it is harvested the labour in connection with it is continuous and very great. The introduction of cotton-growing on a commercial scale would mean the reintroduction of

* 6½d.—Ed. *Q.A.J.*

the kanaka question,* and although I am certain the staple can be produced here all right, the main question is the cost of production. After paying for labour, picking, and railway freights, I am afraid there will be not much left for the grower.

Mr. McLean (Agricultural Adviser): The Department of Agriculture some time ago took advantage of a gentleman going over to Japan, and sent several samples of cotton to that country to ascertain the market value of Queensland cotton there. It is known that a number of growers, or those who would be growers, think there would be a good market for cotton in Japan, and we have taken steps to ascertain what prices our cotton would be likely to command in the Japanese markets. As for the quality of Queensland cotton, I can remember the 1862 Exhibition in London when Queensland cotton took first prize against the world, and that was cotton grown within 10 miles of Brisbane. A very large quantity of the cotton grown on the Logan in the early days was grown by kanaka labour, and I myself can remember the large number of kanakas employed for this purpose by the late Robert Towns. He had practically a cotton plantation, and the cotton used to be sent down in bullock dray loads. The question of cotton-growing has been dealt with in our *Agricultural Journal* more fully perhaps than any other subject, and I do not think anyone here could go to a better source for information.

Mr. J. Mann (Cairns): When Mr. Boyd was up in Cairns he gave us a lecture on cotton-growing, and explained that a machine had now been invented that would do away with hand-picking. He stated, however, that picking was a job that could be very well undertaken by children, and that the question of labour need not frighten anyone who wished to go in for it. The figures, however, that have appeared in the *Agricultural Journal*, in the articles on cotton-growing, would not suit us, however they might do for the South. For instance, the prices that are given for ploughing are too far under the mark as far as North Queensland is concerned.

Mr. H. E. Wyman (Ipswich): My district was one of the first to grow cotton in the early days in Ipswich, and I have still a vivid recollection of the picture the cotton fields used to present in those days. The labour, however, was very great; but it used to be done by families. On the other hand, there were plenty of facilities of getting rid of the cotton once it was grown, for there were several ginning establishments in Ipswich, the farmers being paid for their cotton the same as they were paid for any other product. The Government also gave a bonus for every pound of cotton produced; but when that ceased the farmers started to go in for other crops, and cotton-growing died out. In later years a factory was started, and the provisional directors went round the district and promised to take all the cotton that could be produced. The farmers started to grow cotton with satisfactory results, for the cotton produced was a splendid article. On their bringing it to the mill, however, the company was unable to buy it; and, in fact, the company killed itself in trying to redeem its original promise to the growers, losing on one shipment to London alone over £300. There is no doubt about cotton-growing being successful, but there must first be a market. We must have the people here who will take the cotton and send it home, thereby giving the farmers a return immediately it is brought into the market. The latter part of the career of the Ipswich Cotton Company was one of trouble, for, as soon as the farmers found that the company had a difficulty in immediately paying for cotton brought to it, they ceased to grow the staple, and the company was ultimately compelled to send to Japan for cotton to keep its mill going. That one consignment opened our eyes to the compact way cotton could be packed so as to save freight, but, as for the quality of the cotton, it was far inferior to our

* Kanakas were never employed to pick cotton in East or West Moreton. The work was done by boys and girls, whose school holidays were so arranged as to enable them to do this light work during the short picking season. They were paid ½d. per lb., and could pick from 50 lb. to 80 lb. per day.—Ed. *Q.A.J.*

staple. While it lasted, cotton used to find a tremendous lot of employment for boys and girls in Queensland, and I remember asking one farmer what was the result of his cotton crop for the first season that the mill was going. He said the return was £13 per acre, and that ought to be good enough for those who desire to go in for cotton-growing. Unless, however, there are some firms who will take the matter up of buying the cotton here, our farmers will not be able to enter upon the cultivation of the plant.

The Chairman. There are two things established in the opinion of those who have spoken. The first is that the climate and soil of Queensland are admirably adapted to the growth of cotton. That was established many years ago. The only question open to debate or doubt is the one brought before the meeting by Mr. Jones: Will it, or will it not, pay? At the time it was largely grown in Queensland, there was a considerable bonus, and I remember that in Mackay some of our growers grew a considerable quantity of cotton. I remember 40 acres were grown at Pleystowe, but it was given up for sugar, which was deemed more profitable. At the present time the price of sugar will depend upon the Commonwealth continuing to impose a differential duty against foreign sugars to enable the Queensland and New South Wales sugars to be still grown. If the Commonwealth chooses, there is market enough in Australia for more cotton than was ever grown in Queensland; and, if the Commonwealth chooses to protect the industry, it can do so. With regard to the advantages the growers of to day would have over those of twenty years ago—such as cheaper freights, newer machinery, and a market for cotton seed—it is true that we have them, but they are benefits which we have not a monopoly of. If it is true that we have cheaper freights to England, so too has Egypt. So have India and South Africa, and although it is apparently advantageous to us, since the whole question resolves itself into one of competition, everybody gets the same advantage, and so it really does not make much difference in our favour. I should like to see the farmers generally, or a large number of farmers in the colony, take up the question again, put in a quarter of an acre, count carefully every hour of labour bestowed on that plot, whether by children or by grown-up persons, and every penny spent on it. Then we should be able to say really whether, without some duty, it is likely we can produce cotton as a profitable commodity. But I take it that the Conference may do better work by taking home problems to the different portions of the State, and dealing with them in a systematic manner, as is done in the Sugar Bureau, where a careful record is kept of the water applied to a plot of cane, the growth of that cane, the soil it is in, and so on. So it is possible for any individual agriculturist to add what will be of the greatest value to the knowledge of the agricultural community, if he will make experiments himself, preserve those experiments, and compare them with the experiments of his fellow agriculturists.

THIRD SESSION.

Tuesday, 7th July, 1903, 2·15 p.m.

The session was commenced by the extension of an invitation from Mr. Stupart, the President of the Maryborough Chamber of Commerce, to the delegates to visit the chief centres of industry in the city. The invitation was acknowledged by the Chairman, after which Mr. J. T. Bell, M.L.A., of the Dalby Pastoral and Agricultural Association, made the following speech on the subject of—

THE UTILITY OF MOTOR CARS FOR THE CARRIAGE OF PRODUCE IN COUNTRY DISTRICTS.

I should first of all like to say how genuinely interested I am in having the privilege of addressing for a very few minutes such a gathering of this kind. I feel that it is about as thorough a gathering of Queensland workers—the men who get on to the soil and produce wealth from it—as it is possible to get together within the four corners of the State. I say it is a pleasure to a man who, like most men in public life, finds it incumbent to address large audiences of a very mixed character, to find one's self in front of a gathering of this kind. Whoever is responsible for the *locale* of these meetings, if he can arrange for it to come to the Darling Downs next year and to the town of Dalby, I can promise, on behalf of the people of Dalby, that we shall be only too delighted to see you and to provide every facility for your convenience and comfort. I suppose it is a truism which needs no proof, that one of the chief factors in promoting the successful carrying on of the producing industry is the existence of facilities for transporting the produce to its destination or to its market. That, I say, is a truism, whether in regard to the pastoral side of the industry or to the agricultural, but it is infinitely more important in regard to the agricultural side than it is to the pastoral. The pastoralists can put up, did put up for years, and in a very large part of the colony does still put up, with the slow and long drawn out carriage of his wool to the nearest railway or to port, and yet survive it. But the agriculturist, if he is really to attain any genuine measure of success, must have rapid and regular (I lay emphasis on the regular) means of communication to get his produce to the nearest market, and all my observations are based on the assumption that it is essential, in the interests of the agriculturist, that those facilities should exist. In Australia, in all the colonies, certainly in all the eastern colonies, there have been built railway lines from time to time with the object of providing that facility purely for agriculturists. You will find in South Australia, in Victoria, and in New South Wales that what are called agricultural railway lines are in existence in order to open up the agricultural possibilities of certain districts. And it is a lamentable fact that, scarcely without an exception, there is no paying agricultural line on the continent of Australia. At all events, to be absolutely confident, I shall say that, most assuredly in Queensland, there is not a paying agricultural line.

Mr. MARTIN (Childers): There is one at Childers.

Mr. MANN (Cairns): And one at Cairns A tramway, which pays well.

Mr. BELL: This is a more thorough meeting than I bargained for. After all we have all come here to learn—even those who read papers. I shall say this that, as a Southern man, as a Darling Downs man, when we talk of agricultural lines we exclude sugar. I admit we ought not to do it, but I am talking of agriculture as it is understood in Europe, as it is understood in the Southern colonies, or as it is understood on the Darling Downs. What are called agricultural lines, outside of those connected with purely tropical agriculture, are certainly, right through Australia, unremunerative. I wish to point out, therefore, that the agriculturist, in the sense that I am speaking of him, can hardly look with any confidence towards railway lines in the future, or at all events in the immediate future, as the means of effecting any improvement in his means of communication. Let me for one minute just give you some figures that I have here in regard to two or three agricultural lines. Some of them are in regard to a line that I suppose runs through as fertile and as charming an agricultural district as is to be found in the world. I mean the Killarney line from Warwick. It seems to me an ideal district, and it is difficult to believe that the line is an unremunerative one.

Mr DEACON: No.

Mr. BELL: I regret to say that I have to contradict you. On the official figures that I have here, it is unquestionably an unprofitable line.

Mr. DEACON: The basis of calculation is wrong.

Mr. BELL: Undoubtedly It has been said that you can make figures prove anything, but when you get an official statement of figures, based on the impartial estimate that official calculations are made upon, and they produce a result which is not in harmony with that which you desire to have attained, it is easy to say that the basis of calculation is wrong. I shall say, however, and for all the purposes of this meeting the statement will be sufficient, that the figures that I am now giving you are looked upon by the Government, and by the Parliament of Queensland, as the right figures for calculating whether a line is paying or not. It is a rather hard thing for any man, however enamoured he may be of a particular railway line, to attempt to assure a meeting that a line is paying in the face of official figures. I may say, in regard to this Killarney line, that I happen to know that, in order to make the line look a little better, the authorities will probably make some little concession to it in the matter of calculating the returns from it. They are going to credit it with ten miles greater length of carriage than is the actual length of the line. On the basis of official figures I find that the percentage of net revenue to capital on the Warwick to Killarney line—that the loss on the actual working expenses of the line during the past year, 1901-2—was £776.

The CHAIRMAN: What interest?

Mr. BELL: That is excluding interest. I am not reading out these figures in any feeling of triumph. I am sorry for it as a Darling Downs man, for, if that line had paid, I should have had a railway in my own part of the country long ago It is necessary, however, that I should bring out the-e figures in order to clearly establish my case I therefore wish to remind the meeting that the loss on the line on mere working expenses for 1901-2 was £776. In 1900-1 it was £990, and in 1899-1900 it was £889. For two years previous to that the revenue was also hundreds of pounds behind the working expenses in each year. These figures include nothing whatever of the interest on the money which was borrowed to construct the line—interest which we as taxpayers of the colony of Queensland have got to do our humble part in making good. There is another line which Mr. Deacon probably knows something about, and that is the Allora line. This is one of the guarantee lines.

Mr. DEACON: Drought.

Mr. BELL: Probably it is the drought. I should be only too delighted if I could join with Mr. Deacon in such a satisfactory explanation for the whole thing. But I want to emphasise the actual facts of the case—the result, whatever the cause may be. In 1901-2 this line did better than the Killarney line, because it covered the working expenses and paid a percentage of 18s. 8d. on capital. We probably, however, got the money at about £4. That is, for every £100 that line cost either the guaranteeing local authority or the State the local authority has to make good, roughly, a difference of £3. For 1901-2 that line managed to pay its working expenses, but unfortunately on the previous year there was a loss of £432 as regards working expenses. That line also runs through a splendid piece of country. Another line is one from Pengarry Junction to Crow's Nest, near Toowoomba. That is a purely agricultural line, and, without troubling you too much with figures, I may say that in 1901-2 that line returned a net revenue to capital of 15s. 5d. That is not a guaranteed line, but the taxpayers of the State have to find the difference between 15s. 5d. and £4 for every £100 spent on the construction of the line. The previous year the return was 14s. 5d., and the year before that 14s. 2d. Now, for the Ipswich to Dugandan line. I find that last year that line returned £1 11s. 6d. per cent., so the general taxpayer has again to make good the difference between £1 11s. 6d. and £4 for every £100 borrowed to build the Fassifern Railway. The previous year it paid 2s. 2d.; the two years before that 3s. 5d. and 8s. 11d. respectively, while in 1897-98 it yielded £1 2s. per cent. Those are all very sad figures, not merely because we, as taxpayers, have to make up the deficit, but they are sad in all the possibilities that they suggest in the blocking of the further construction of railways. Because, if they paid, there would be infinitely more branch railways. The sum and total of those figures are that, as long as the finances of the State are as they now are, no matter what the name of the Parliament would be, you cannot expect a Parliament of Queensland that is sensible of its duty to the colony—in fact, no

Parliament we are ever likely to have elected is ever likely to do so—to assent to the proposition to borrow more money in the European market in order to construct these unremunerative branch lines. We must look elsewhere to see if we can find a better method of transporting the produce of the farmer to market. I believe I am to make a suggestion which will very largely solve the problem, and which, if it is not equal to a railway, is the next best thing. What is that method of transport? It is the motor vehicle, the vehicle that is self-propelled. It is not my purpose here—in fact, I have no knowledge to give—to give a history of self-propelling vehicles. I believe I may say here that they really preceded railways, and for a short time in Great Britain (I do not say the Continent), steam was first utilised in connection with vehicles to run along public roads. And then somebody discovered that these vehicles would run with much greater speed and ease on rails; rails were adopted, the railway came into use, and the idea of using steam vehicles on the public roads was abandoned. But now they are coming back into fashion, and the vogue has only been in existence, I think, for about four or five years. During these last four or five years the knowledge that has been gained in regard to these self-propelling vehicles has been utilised chiefly for the purposes of pleasure. These motor cars, whether propelled by steam or petrol, which I believe is the approved method of propulsion, have been every half-year witnessing tremendous improvement and development until, to-day, they are able to carry a number of people, and on the metal roads that are to be found on the Continent they can run up to 80 miles an hour for an appreciable period of time. The makers of these cars and the whole trade are turning their attention—are not confining their attention exclusively to cars for pleasure purposes—to the region of business. And now, whether in America or in England, we now find motor cars for business purposes coming steadily into use. A couple of months ago I went to the head of the Government, Mr. Philp, and asked him if he would communicate with the Agent-General in London and ask him to get the latest information on the subject of motor cars. I should like to say here, you read a great deal against Mr. Philp, but whenever I have gone to him on any matter connected with public affairs I have found him as keen as a man could be to fall in with a proposition, and he at once assented to my proposal to communicate with the Agent-General. He cabled home, and I only saw a copy of the cable a short while ago. I am rather sorry I did not see the cable before it was despatched, as I might have been able to suggest certain alterations which would have made clearer what we wanted the cars for. The Agent-General, however, sent out a number of publications from the chief works showing the latest cars they had in so far as they would likely to be of use in Australia. It is clear to me from looking at the prospectuses, some of which I have here, that a vehicle has been evolved suitable for the conveyance of farming produce, and a vehicle which could be put on to run from the nearest railway station in any ordinary district to any point—10, 15, 20, or 25 miles off—and run regularly on a bush road, carrying a load up to 4 or 5 tons, and transporting it at an average rate of 5 miles an hour. I admit that there may be a great deal of discussion as to what is the ideal of a vehicle to use for transporting farmers' produce in this way. I have no doubt that we shall find, as the construction of motor vehicles goes on, that the ideals as to what is the proper vehicle will change, but what I am able to assert is that a vehicle exists now, at the present stage of development of machinery, which will enable produce to be carried over country roads in quantities up 4 or 5 tons and at a rate of about 4 or 5 miles an hour. I discussed this question with a gentleman who had been in South Africa, and he told me that he regarded the practicability of motors as beyond discussion. He said he saw motor cars going over country roads similar to Queensland roads, carrying from 5 to 6 tons, going into spruits or creeks and out of them with the greatest ease, and averaging 6 miles an hour. I say that when a vehicle such as that exists and can be bought, as it can be bought in Great Britain, for between £750 and £850, then it is a vehicle that should be experimented with in Queensland. Whether the Railway Department, or the Government of the day, intend to take it up as a substitute for branch lines, or whether the local anthorities should take the matter up, I say, whoever is to do it, it seems to me that the Government should introduce one of these machines into Queensland, place it in an agricultural district, and show what can be done. Because, if you can do what it does in South Africa, it will be a tremendous factor in promoting the success and development of agricultural districts that are now absolutely isolated. I have agricultural districts in my mind's eye in which the conditions would be transformed if they had one of these machines in operation. For one thing, they would have the dairying industry, which is at the present time outside the scope of successful operation. I mention the vehicle which can be obtained in England of the largest and most cumbersome type. There is another vehicle now being experimented with, and I have been told that this year is likely to see in existence a vehicle which will carry about 2 tons, and be able to average a speed of from 10 to 12 miles an hour. When you get a vehicle like that, it is as good as a railway. That is one of the possibilities of the motor car that is likely to be attained at no very distant date. In Queensland at the present moment I think there are two amateurs who possess motor cars. One is Mr. R. C. Ramsay, of Oondooroo, aud the other is Dr. Hopkins, of Brisbane. I do not know of any others, although I believe there are several owned by agents. As for these two cars, it is sufficient to know that both have been tried over country roads. Mr. Ramsay's frequently runs the 18 miles from Oondoroo to Winton, and the other day with a passenger, my brother, he went from Winton to Longreach and back. There was an account in the paper of some mishaps, but my brother tells me that the mishaps, as a matter of fact, were very trifling, and that he feels certain, after his first experience, that the motor cars are going to be a tremendous thing in Queensland in the future, and that his experience had made him a thorough believer in them. Dr. Hopkins is going into the Dalby district with me in a few weeks' time, and we shall put the car into operation there. Mr. Ramsay's car is made by a French maker, and is of 5½-horse power. Dr. Hopkins's is an American machine, an Oldsmobile, and is about 5-horse power. There is no doubt that these machines will run in a country district, and Dr. Hopkins has found no difficulty with his on country roads. It has always been assumed that these machines will be helpless in wet weather, and that the running of them on muddy roads would be out of the question. But, with the long spells of dry weather we have in Queensland, it would be much better to have motor cars even if we had to bring them to a standstill in wet weather than to be without them. On this point, however, Dr. Hopkins wrote me the following about three days ago:—"I have much pleasure in informing you that I have driven my motor car through thick clay and mud, in which I saw two drays and buggies stuck fast, while I easily sailed past them." I am convinced that the petrol car is adapted to commercial purposes in country districts, and the motor wagon is a far more economical way of transporting produce of the land than by the railway, seeing that when the motor ceases to work the expense ceases. It shows that they are not blocked by wet weather as easily as some of us have been disposed to imagine. I shall merely say, in conclusion, that in regard to this question as to whether the Railway Department should or should not take up the running of machines of this kind, that I am disposed to think they should, as it does not mean the erection of costly buildings or the employment of fresh hands. It would merely mean the employment of one man for each machine. In regard to whether the Railway Department or the local authorities should do it, it is interesting to know that somewhere about ten years ago, before the line was extended to Cunnamulla, the General Traffic Manager, Mr. Thallon, made a suggestion that the Railway Department should not extend the railway line, but should erect a goods-shed in Cunnamulla, receive there the wool and other produce, and undertake to transport it from Cunnamulla to Charleville by drays or by contract. It is interesting to know that among those who approved of the proposition at the time was Mr. Philp, and Mr. Philp at that time was unconsciously in the nature of a prophet, for he suggested that steam road engines might be used to convey the produce from Cunnamulla to Charleville. Mr. Thallon told me that himself, and it will simply be an extension of that principle if you get the Government to introduce these vehicles, and to run them from the nearest railway stations into the farming districts. But, whether this Government does it or not, I am sure that the introduction of these vehicles into our agricultural districts will be an event of no very future date. With all my heart and soul, wishing well to the farmers, I hope the time is not far distant when those vehicles will be introduced.

Mr. H. A. Tardent (Toowoomba): I would like to put the farmer's side of this question alongside that of the squatters, for all over the world it is recognised that the agricultural lines are the best paying ones. The fact that in Queensland the agricultural lines mentioned by Mr. Bell do not pay shows that there is something wrong, not in the State of Denmark, but in the State of Queensland, and I am satisfied from the experience of other countries and of this State that the fact that the lines do not pay is not due to the non-fertility of the State nor to lack of energy on the part of the farming community, but to the wrong policy applied to those lines. Mr. Bell has mentioned the Crow's Nest line as one that does not pay, but I know many farmers who cart their produce rather than use that railway line. Can that mean anything else but that our railway freights are prohibitive? If you bring down freights to fair proportions, you will find that the railway lines pay all right. In any event, in my opinion, if those lines were not paying, it would pay the Government to run them at a loss. As for motor cars, I am thoroughly satisfied that they have a great future in this country. The military departments in Europe, which are always on the lookout for improved methods of transport, are going in for them, especially Germany and Switzerland, and, if they are suitable for military purposes, they should be suitable for agricultural purposes.

Mr. Deacon (Allora): Although I shall not go as far as one gentleman I heard talking to-day, who called railway freights "frights," I yet think that our present railway freights do frighten a lot of traffic away. Mr. Lamb and Mr. Atkinson may be left to defend the Killarney Railway, but I again say that the basis of calculating the returns from the branch railway lines is wrong, and I believe that, if the basis in force in America and Great Britain were adopted here, it would be found that the feeding lines in Queensland pay handsomely. In any event, if a main line cannot be made to pay, it is rather unfair to expect the branch line to do so. As for the Allora line, it is only 3 miles in length, and you can hardly expect a 3-mile line, with its own driver, stoker, guard, station-master, and all the rest of it, to pay extraordinarily. It has been in operation four years, and last year we paid 2 per cent. to make up the guarantee. But we get no credit for a station-master and porter on that line who do work for the main line. We do get an allowance of $2\frac{1}{2}$ per cent. for it, but that is altogether out of proportion to what we should get. If the Killarney Railway got a fair allowance for the business it does, it would come out on the right side. As for railways not paying, if there were no railways the Government would have to make roads, as it had to do in the beginning, and from roads there is absolutely no revenue. In bringing forward this proposition on the subject of motor cars, I think the idea is really behind the times. The first step for the promotion of intercourse in a country without waterways is the putting down of a road. The next improvement is the putting down of rails on that road or on another road specially constructed for the purpose. Mr. Bell's proposition involves going back to the ordinary road, but I maintain that, if there is to be any real advance, you must have rails, be your means of propulsion petrol or coal. Mr. Bell stated that vehicles could be obtained capable of carrying 4 or 5 tons. There have already been traction engines on the Downs, and I believe some have found them of excellent service. But a quarter of an inch of rain hangs them up, and this at once illustrates the all importance of the rail.

Mr. W. D. Lamb (Yangan): I have, perhaps, had as much experience in the hauling of heavy loads along our country roads by other means than animal power as any man in the room; but, coming first of all to the question of the Killarney Railway, I am sorry to say that the line does not pay according to the official figures, but I agree with Mr. Deacon in his contention that the basis on which those figures are calculated is wrong. Moreover, if more care and attention had been bestowed on that line when it was being constructed, things would probably be different to-day. That, however, is past, and coming back to the motor business I will say that if you go in for petrol or electricity, or whatever you may adopt for light running on the roads, that if you want to carry a load along a road you will have to make that particular road fit to withstand the pressure that will be applied to it. I have had an American thresher for only a few years, and yet I have been compelled to practically construct the wheels again. The Darling Downs roads pull them to pieces. On the Downs, in fine weather, you can pull a load up to 40 tons, but directly a shower of rain comes you are stopped dead. You cannot move, and you have to put on the special appliances for making the wheels grip, for if that is not done you only dig a hole for yourself to stick in. We have also got the local authorities to fight against in this matter. I remember once being peremptorilly ordered out of one town. I sought legal opinion on the subject, and was advised to take the hint that I was not wanted and go. However, I think Mr. Bell is right in his idea that we should be on the lookout for some other means of carriage than by means of branch lines. We cannot afford to build expensive branch lines, but if we are to use motor cars we must have the roads. On black soil you get stuck dead with a traction engine in wet weather, and you have to wait for fine weather before you can proceed. At times I have believed that the motor car is the coming vehicle, and in England I saw them taking the place in the streets of busses. They were running successfully, too, but they are a more go-ahead people in the English towns than they are in the Queensland towns. You are not ordered out of the town there. I am very glad Mr. Bell opened up this subject, for, as one who has had experience in traction power, I certainly think there is a great future for it.

Mr. Clarke (Dalby) concurred with the remarks made on the subject by Mr. Bell, whose invitation to the Department to hold the next Agricultural Conference at Dalby he also heartily endorsed.

Mr. R. Hoggan (Lyra) contributed a couple of interesting extracts on the subject of motor cars from C. Marvin's "The Region of Eternal Fire" and Sir Henry Thompson's "The Motor Car."

Mr. J. McCartney (Forest Hill) touched on the question of the handling of produce, and pointed out that if Mr. Bell's scheme was put into operation the loading and unloading in connection with the motor cars would have to be given special attention.

Mr. J. Mann (Cairns): Between Cairns and Mulgrave 30 miles of tramway are built with a 3-feet 6-inch gauge. All the work was accomplished by white labour, and the lowest wages paid were 8s. a day. The line also pays better wages to its employees than the Government does on Government lines. The lowest wage is 8s. a day, while the Government up there pays 7s. 4d. That tramline also charges less for freight than the Government. Yet that line has paid interest and redemption up to date fully, and has the sum of £5,000 to its credit in the bank. So successful has been that tramway that it is proposed to build feeders to it, by granting extensions to groups of settlers on certain terms and conditions. On that tramway it is contended that one horse can pull as much as twenty on a bad road, and what has been done in Cairns can be done in another place. If any gentleman here wants any information on the subject he has only to write to the secretary of the tramway, Cairns, who will be only too glad to furnish the necessary data.

Mr W. Ewart (Brisbane): I listened with great pleasure to Mr. Bell's address, for it dealt with a subject I feel great interest in, and one which I avail myself of every opportunity to discuss with engineers and others who are likely to know anything of it. The tramway company is bringing forward a petrol engine for the Nambour-Dulong tramway, and, if it is a success, it will mean a big saving to the managers of the Nambour tramway. It is doubtful, however, whether it would be so practicable on a road. I believe you can work a petrol engine for a fifth of the cost of an ordinary engine; it can carry its own load, one man can look after it, and no guards or porters are wanted on the line. It certainly opens up great possibilities for tramways. I am still, however, of the opinion that you will not be able to work a traction engine on ordinary roads and carry heavy loads, because there is not the slightest doubt that the jolting of the heavy roads would shake any engine to pieces.

Mr. G. Martin, M.L.A. (Childers): Had any of us, ten years ago, listened to a gentleman reading a paper on bicycles, we would not have credited the advances that were to be made in that means of locomotion; but still I do not agree with Mr. Bell in his proposition in many respects. Mr. Bell, however, is to be complimented on the subject that he has put before us, because we have now the border barriers removed, and must remember that in the South they have better means of communicating with their markets than we have. They have water carriage down there, while we practically have none, and we shall very rapidly have to take into consideration the question of how we are going to compete with our Southern neighbours. What constitutes a railway paying? It is not a return of 5 per cent. on the outlay. The railway in my district has paid more than 5 per cent. on the cost of building it from the start, but, if it had not done so, I think I would be justified in opposing the contention that it did not pay. In fact, the reason why our railways as a whole are not "paying" is because there are not sufficient light lines to the agricultural districts. Dealing with the main object of Mr. Bell's address, it must be borne in mind that, if motor cars are to come into general use, roads must first be constructed.

Mr. Tardent: And bridges.

Mr. Martin: It would have very nearly cost as much to construct a road from Isis Junction to Childers as it did to build the railway line. In the present rough state of our roads I do not think they will ever carry motor cars. The whole question, however, is a vital one. We must have our back country opened up, for Queensland will never be worth a rap until it is.

Mr. D. Brown (Roma) furnished an interesting contribution to the discussion. He dealt chiefly with the possibilities of the motor car as a machine for doing the work of horses on a farm.

Mr. F. W. Peek (Chamber of Agriculture): I am very pleased that Mr. Bell has brought this matter of motor cars forward, as it is a matter that every agriculturist will be interested in, especially in the light of the scientific research that has been lately made in the other parts of the world. I am afraid that Mr. Bell will be charged, as I was charged at some of the previous Conferences, with being too previous. Some twelve months ago I received a communication from the De Dion Company to the effect that they could land from the ship a motor car for from £65 to £80 that would be capable of carrying one passenger with 150 lb. added at a very small cost. I forwarded that communication to Mr. Drake, the Postmaster-General, and suggested to him that that was the power for the Western mails. Since then I have had the pleasure of coming across Mr. Trackson, who is endeavouring to make arrangements for the running of an omnibus capable of carrying from eight to ten passengers between Belmont and Brisbane. A gentleman tells me that particular scheme has fallen through, but the motor omnibus will come all the same. Mr. Trackson tells me he has one under way, and anyone who goes to Brisbane should make it a point of seeing that gentleman's car. I believe the Belmont omnibus was to have cost £800. The De Dion is a simple motor for any vehicle carrying light loads. It would suit a dairyman or anyone who has to convey light produce to market. There has been a good deal said about the construction of roads, but I must admit that I believe that in certain parts of the State the motor car could not be applied, particularly in hilly districts, without the use of tramlines. In that connection I would suggest to those gentlemen, who have not had the chance of seeing it, to get a work on the mono rail system, as it is one that can be inaugurated at a comparatively low cost.

Mr. F. M. MURTAGH (Nambour): We have in the Blackall Range district a light tramway, and I think it is to be regretted that Mr. Bell, in order to bring substance into his subject, should have had occasion to criticise the building of light tramways, because I am quite satisfied that there are several districts that the motor car will apply to, and will undoubtedly be of great service. In rugged country like that where I live, which is as rugged in its grandeur as it is rich and fertile in its soil, the motor car will be of very little use, especially with a season like the first six months of the present year, when we have had 42 inches of rain, or an average of about 7 inches a month. On our steep gradients you ascend a grade of about 1 in 4, although when you get to the top you have about 50,000 acres of as magnificent a piece of country as is to be found in Queensland. You could, however, hardly get to that plateau with a motor car on an ordinary road. We have already built light tramways in the district, and the local authority has another in contemplation. Knowing the immense benefit these tramways are in certain districts, I again regret that it has been necessary for Mr. Bell to pass such criticisms upon them in order to establish his case. I admit that motor cars are probably the coming power for land like the Western country and the Darling Downs, but in rugged country I think it will be found that the tramway is an essential factor in the development of agriculture.

Mr. FIELDING (Redland Bay) pointed out that Mr. Bell did not object to the light railway, but that, failing that, he advocated the next best thing. It went without saying that a railway was better than a road.

Mr. BELL: I wish merely to make one or two supplementary remarks in regard to the criticisms made upon my observations. In regard to the practical work that these motor vehicles are already performing, in their initial stage though they still are, I may say this, that in Louisiana, in the Southern States of America, in the rice fields (and rice, as you know, grows in an exceedingly moist soil), the ploughing and harrowing are done by electric motors, and I have been told to-day that there is a station on the Darling Downs which is about to order a motor for ploughing from England. With regard to that machine of Dr. Hopkins, which he proposes to try in the Dalby district, and in which he carries out a very large practice in Brisbane, I may say that he tells me that it does the work of four horses at a cost of 10s. a week. It is a petrol machine of 5-horse power. In regard to the criticism of the gentleman from Laidley, it seems to me that the farming pioneer would be quite prepared to suffer any possible inconvenience in having his stuff taken out of a motor car when the railway station was reached, and having it placed on a railway truck. But if the idea is carried out that the Railway Department runs these vehicles, then, of course, they will have to undertake the responsibility and labour of doing the transporting. It merely means an additional porter at the railway station.

Mr. TARDENT: All over the world the railway authorities do that.

Mr. BELL: It seems to me most appropriate that they should do it. I do not wish to go into the point that the gentleman from Cairns alluded to about the Mulgrave tramway. No fair comparison can be drawn from the experience of a branch line in a cane-growing district. The branch lines I have been talking about are Government lines, and the Mulgrave line is, practically speaking, a private line.

Mr. MANN: It belongs to the ratepayers. They have a large staff.

Mr. BELL: It cannot be as large a staff as the State Government's. Although I am going a little out of my proper course, I am bound to say that it can hardly be gainsaid that a State Department will always find it a much more difficult matter to run a railway as cheaply as a private corporation.

Mr. Mann: Ours is run by the Board.

Mr. Bell: I appreciate your distinction that it is not run by a company in the American or English sense. But your body is infinitely more related and closely connected with an English corporation for the purposes of that railway than it is to the State Railway Department in Queensland. Because, whenever a State Railway Department starts to make economies and to run its railways cheaply, there is always a tremendous howl all round the place because it is doing it. That is why a private concern of this kind can always run its business more cheaply than a private firm. Let me say that I am grateful to you for the kindness you have shown me over my remarks. I admit at once that a railway is better than a motor car. For years, one of the burning questions in my electorate has been a line authorised by the Government, but which has not yet been built. I find whenever I bring it up in the House that I am met by the question, Will it pay? At the present moment, constituted as this Parliament is, or any Parliament that we are likely to get, it would be folly to expect that Parliament is going to authorise for some years to come the construction of these railways. If it did authorise them, we know well enough that the Government would have to pay something like 5 per cent. for the money, so there is not much hope for the immediate construction of these lines. I think a strong case has been made out for the introduction of these motor vehicles, and what should be done is, that the Government should import one of these machines, run it from a railway line to an agricultural district; and then, when the success or otherwise of that method of transport has been demonstrated, it will be left to the Government to take it up or leave it to the local governing bodies. I certainly think it is the undoubted duty of the Government of the day to immediately import one.

The Chairman: After the exceedingly interesting speech delivered by Mr. Bell, perhaps it is hardly worth my while to offer any remarks whatever. It is a great pleasure to hear Mr. Bell on any topic. The subject he has introduced is one that has evidently proved exceedingly interesting to the delegates. With regard to the proposal made by Mr. Bell, I may say that I consider it a modest proposal, and one on lines which have been adopted by the Government in other matters. He does not propose that the Government should instantly rush into the market, buy motors and run them all over the country. He merely says the Government might get a motor and make an experiment with it. I hold that it is a perfectly legitimate province of the Government to make experiments. As to how far the Government can undertake those functions which are mainly discharged at present by private enterprise, that is a matter which I am not called upon to express an opinion, but in a matter of experimenting, whether prospecting for gold or prospecting for water or in matters of education, you cannot reasonably expect private enterprise to enter into those fields, because there is not sufficient remuneration. If the Government by offering a subsidy, assist in the discovery of gold, a large proportion of the benefits is likely to be shared by the whole of the nation. The benefit arising from the presence of gold or water in a particular locality is not always shared by the person who teaches the public that they are available, and therefore it seems to me that the proposal of Mr. Bell is one which I cannot, as an individualist, take any exception to. There are certain functions which I hold the State may take upon itself. This proposal is one which may be taken into consideration perhaps by this Government, but more particularly ought it to be taken into consideration by some of the other States. For the more populous the State, the more necessity there is for trying such experiments. It seems to me that the first persons to try an experiment of this sort are really the Commonwealth Government, who have a great postal department. Whatever may be said of the advantage of motor cars as a commercial investment, it is quite clear that a country which is subject, as is the West, to long droughts, is one in which motor cars might obviously be tried. If motors come into use for comparatively slow carriage, it will be because it has first of all been discovered that they are useful for speedy carriage. There are a great many reasons why the postal authorities should make an experiment in this direction. Mr. Bell has made a suggestion, which is one to be considered, perhaps by you and certainly by the Department, as to where the next meeting of this Convention shall be held. I think I can venture to thank Mr. Bell on behalf of the delegates for the invitation which he has given to us to come to Dalby. But at the present time I could not take upon myself to accept the invitation. I could not go further than to thank him. There will be doubtless other electorates and districts which will be inclined to make a similar invitation and show the same hospitality. In due course the claims of any districts which are good enough to offer you and us their hospitality will be considered, and Mr. Bell's offer, I am sure, will receive the consideration which it deserves, both on account of the people of Dalby and the fact that it is the first invitation that we have received. With respect to the question of the railways paying, it has been alleged that the railways do not pay. Some say they are not expected to pay. But the main fact is that the branch railway lines do not pay. The Railway Department has pointed out that a greater credit should be given to branch lines than the railway authorities have hitherto given, and the Commissioner has promised that in his report a larger proportion of the earnings of the main line will be credited to the branch line. But what I want to mention is, even if we take branch lines, if we take every line in the State, where it cannot be urged that a fair proportion of the earnings is not credited, they only returned an interest of £1 18s. 9d. per cent. on the capital expended, whereas the interest on the money borrowed to construct them is considerably more than that, and that deficiency has to be made up. Therefore the contention of Mr. Bell was to show that there was a limit to our borrowing power, and that where a proposal for a railway might be refused, it would be possible to find other means of communication. It has been said the railways do not pay in this colony because of some deficiency in their management, and it has been said that the railways do not pay because of some default in the agricultural industry. It has been said that railways which depend solely on agriculture, exclusive of the sugar industry, do not pay. That statement may be a correct one, but the inference drawn from it may be wrong. It may be a railway to a goldfield does not pay under certain conditions But the great condition in whether railways pay or not is this: There must be population. If we say a railway does not pay and it is a railway to a goldfield, we have no right to blame the mining industry. The Government, in the discharge of public duty and in order to satisfy the public demand, have made railways in Queensland, and we have a much greater amount of railage per head of population than there is in any other part of the Commonwealth. That is the cause of the difficulty we have in making our railways pay. When you settle the Darling Downs as it might be settled, then the agricultural railways will pay just as they will in any other district. The cause of embarrassment is that sparseness of population. It is easier to make a railway pay in New South Wales, where, if you take the population and area combined, they have got an area of half of what we have got and a population three times as great as ours. Therefore they are in a better position than we are to make their railways pay. When you consider that in some parts of Europe there are 300 people to the square mile and that we have got more than a square mile to every human being, there is no wonder that there is a difficulty in making our railways pay. Some people oppose an addition to the population on certain grounds which are satisfactory to themselves, but I am talking to you of an economic problem. We have 2,000 miles of railways, and what we want to make these railways pay and enable us to bear the cost of them is a larger amount of population. Personally, I believe that Queensland would be a vastly more easy country to govern, and more prosperous, if the whole of the population could be swept up into one corner of it. The cost of the railways with such a large area and such a small population is utterly out of proportion. I should like to point out one or two little drawbacks with regard to motor cars as opposed to horses. There is very little chance of our making motor cars in the colony for a very long time. There are only three or four great manufacturing nations which are in the field with regard to those cars. We shall have to import motor cars, and we shall have to send something out of the country to pay for them. Then the effect of prolonged wet weather or motor-car communication has to be considered. Although Dr Hopkins, who lives in Brisbane, is able to drive his car through mud and in wet weather, it does not in the least follow that if Dr. Hopkins took his car on to the black soil downs that he would be able to drive it there.

On the motion of Mr. Deacon, the subject of Mr. Bell's address was then referred to the Committee on Resolutions.

The next business was the reading of the following paper by Mr. Lindsay:—

LIGHT TRAMWAYS FOR AGRICULTURAL DISTRICTS.

[By James Lindsay, Buderim Mountain.]

Roads.—The subject that I have selected for my paper is a very important one, although many delegates present may consider that my subject does not fall within the province of an Agricultural Conference to discuss. I consider that it does. The question of roads or the means of getting our produce from the farm to the market in the easiest and cheapest way is of vital importance to us farmers. Roads form a subject that receives a great amount of attention and discussion at the farmer's fireside. At all farmers' meetings, where the discussions often become caustic, and the members of the shire councils come in for a lot of hard criticism for not doing just what the irate farmers or ratepayers consider proper, such discussions go on every day within the boundaries of every shire council in Queensland, and will ever go on while the present system of making earth roads continues. Local government has now been in existence for more than twenty years, and during that time no new or improved method of making roads has been introduced. There is no progress. We drag through the same old bogs and holes. We bump over the same old corduroy loggings and ruts that we were accustomed to in the good old days of Government road-making before divisional boards were instituted. Now, there must be some reason why there has been no advance in road-making, or why no other method has been substituted for the present wasteful and unsatisfactory system. I think the reasons are not far to seek, especially in country shires. One great reason is that new roads and their upkeep increase in a greater ratio than the rates. New settlers coming into the shires are compelled to go farther and farther back to obtain their lands, consequently new and long roads have to be opened up, and, as the rates on new selections are too low for the purpose, the shire council is compelled to use other rates to do so. Under such conditions it is impossible to do justice to all roads. Roads are many and rates are few, therefore the rates are spread over all the roads in the shire, with the result that few of them are good and most are thoroughly bad. No doubt the shire councils do the best they can, but it is impossible for them to make any advance to better the condition of the roads, by macadamising or other methods, for the want of money. Good roads are just as necessary to farmers as good manure to make farming pay. When farmers have to travel 10 to 20 miles to the railway station, over bad roads, with their produce, it means that they are heavily handicapped in the race for success. Is there no remedy for this heavy haulage of produce? There is, and that is by the adoption of a system of

Light Agricultural Tramways

in those districts where agriculture is extensively carried on and good payable freightage guaranteed. There are very many such districts in Queensland.

Tramways and Roads Compared.—The question of light agricultural tramways is now receiving great attention in many parts of the world, and no doubt, wherever they can be worked successfully, must prove a great boon to farmers. Anything that will save the farmer loss of time and labour in hauling heavy produce on roads, and enable him to expend that time and energy on the farm instead, must be profitable. A tramway will do that. The advantages of a tramway over a road, to shires and farmers alike, are many. A tramway is better to travel over than a macadamised road, and cheaper to build and maintain. A tramway is a valuable property, and perhaps may turn out a good revenue-producer. An earth road, be it ever so good, takes all, but returns no revenue. A tramway opens up and raises the value of all lands it passes through. It promotes settlement and increases production. It introduces industries by giving good facilities for transit. It economises the working of the farm, by saving heavy and expensive haulage of produce. It saves the time and labour caused by travelling on the ordinary road. A road does not appreciably add to the value of lands; it is no asset to the shire council, but instead is a constant liability and trouble. A road is like a purse without a bottom—you can keep pouring the money in, but it all goes through. Every heavy rain destroys pounds' worth of labour. A bullock-driver, with his team of fourteen or sixteen bullocks and heavily-loaded timber wagon, will destroy in one hour more road than the shire can repair in a week. A tramway, no matter how heavily it may have rained, would remain sound and hard, ready to do its duty in all weathers. No bogs; no ruts; everything smooth and easy. The products of the farm go along to the Government railway stations, at the gentle rate of from 10 to 12 miles an hour, while the farmer remains on his farm working away, producing more crops and more money. On an agricultural tramway speed is not so much a necessity as reliability. If the farmer knows that his produce is going to its destination safely and well, there is no worry about anything happening to his teams, vehicles, or drivers, because they are late getting back home. The cost of the tramways will, of course, vary, according to the nature of the country they are built over. I was told by an experienced engineer in tramway building that tramways of 2-feet gauge, with 30-lb. rails, can be built over level country, at from £500 to £600 per mile, and where there is no timber to clear away, probably for less than £500 per mile. My idea of an agricultural tramway is a 2-feet gauge, 30-lb. rails, worked by a 20-horse-power oil motor. Such a tramway would be ample for all agricultural requirements.

SECURITIES ON LOANS, ETC.—The Government lends the shire councils the money, and holds the whole shire responsible for the loan. The shire council then sets apart a benefited area, and holds the ratepayers in that area responsible to the shire by making them pay a special rate. That is as it should be—those that are benefited should pay. Now, I think that farmers who desire a tramway can give a further security that would not be detrimental to themselves, and which would be a further inducement for shire councils to take up tramway building. That is, by offering personal bonds to cover the redemption and interest for a stated period or for the whole term. Say, for instance, that 100 farmers desire a tramway that will cost £10,000, and they are not sure that there is sufficient traffic to cover all that is wanted. It would be safe to offer personal bonds to the extent of £5 each, thus guaranteeing to the shire £500 per annum, subject to the following conditions:—

First: Should the tramway not be able to pay its own way entirely, then only so much shall be called up on the bonds as is necessary to make the deficiency good, the call to be *pro rata*.

Second: Should the traffic be able to meet every expense on the tramway, the bondsmen to be released from their bonds.

Such bonds would be no hardship to the farmers, and would be a good guarantee of their earnest faith in the tramway and of their determination to make it a paying one. And the shire council, having double security, would be safe in the undertaking.

CONCLUDING REMARKS.—Owing to the Government being unable to construct branch lines to connect outlying agricultural centres to the main railway lines, and to the fact that new settlers have to keep going further back, until such time as they get beyond the zone of distance in which farming pays, through excessive and expensive haulage of produce, it is clear that in such centres the tramways are a necessity if the land is to be made useful and productive. The amount of traffic necessary to pay the working expenses of a Government railway would, I am sure, make a light tramway pay well. Of course the shire councils will have to be cautious in selecting routes. They must see that the land is good, and that cultivation is carried on sufficiently to produce crops to create payable traffic. But there are two kinds of cautions—the caution of timidity, and the caution of prudence. The first spells failure from the start; the second, being duly observed, and where everything is favourable, then it is the duty of the shire council and the farmers to put all their energy and determination into their work, and there is no fear but the tramways will be a success. I consider the Government might do a great deal to make the tramways a success by letting the shire councils have the money at the lowest possible rate of interest. It would not lose if only 3½ per cent. were charged, because most of the tramways would be feeders to the main railway lines, thus bringing increasing freights. The Government would also be relieved from building branch lines, so that on the whole I think the Government would gain instead of losing by letting the shire councils have the money at 3½ per cent. If the shire councils could get such cheap loans, it would be possible in our lifetime to see many hundreds of miles of such light agricultural tramways built, bringing in good revenues to the shire councils, and proving a great factor towards the advancement and prosperity of the agricultural history of Queensland.

The time available did not permit a discussion upon Mr. Lindsay's paper, which was followed by a contribution from Mr. R. Hoggan, of Lyra, on—

FARM POWER.

[By R. Hoggan, Lyra.]

GASOLINE ENGINES.

Not in vain the nation striving, not in vain the ebb and flow,
Error mazed, by Truth directed, to their certain goal they go.

It is a matter of regret, and to many of wonder, that the industrial heart of our Empire, whose pride is in industrial supremacy, should not be able to send its blood pulsating through the agricultural arteries of its several parts; but, lamentable as is the necessity, farmers in the colonies are constrained to get most if not all of their machines and implements either directly or indirectly from their transatlantic brethren. True it may be that the English article is better finished and more durable, but as a rule it suffers from a high price and a cumbersomeness which the small cost and light design of corresponding American machines put out of competition. The reason for this is a complex one; but, perhaps, were the English manufacturers furnished with the stimulating influence of a home market at their very doors, so as to provide not only consumption, but an intimate knowledge of farmers' wants, we should not have to indulge in the same regrets.

The following article, however, extracted from a recent Chicago paper, shows apparently that the appreciation of American methods and machinery is not confined to the colonies; and to the conservative Englishman the tacit admission by English manufacturers of the superiority of these in their contemplated revolution of affairs will occasion some surprise:—

Americanising British Plants.

"In order to equip itself for a stern grapple with the United States for the markets of the world, the British steel and iron industry is undergoing reorganisation on American lines, which practically constitutes a revolution in the country's entire manufacturing system, says a London cable. Dozens of the greatest mills, foundries, furnaces, and collieries of England, Scotland, and Wales are already engaged in preparing for a wholesale remodelling process. Many tons of machinery that have stood the test of times are being ripped to pieces and thrown on the scrap heap to make room for expensive appliances manufactured in the United States, or made in England according to American patterns. It is conservatively estimated that within the next two years the steel manufacturers will spend from £25,000,000 to £100,000,000 in bringing their plants up to the American standard.

"British ironmasters have finally turned their backs on tradition and the domination of trades unions, and have decided on a merciless departure from mediæval methods. The present comprehensive movement aims at the introduction of every scheme and process that will bring about economy in production. It will be interesting to observe how the British working men take the new conditions. The great engineering strike of 1897, which resulted in a loss of 7,000,000 working days and gave the United States and Germany their first opportunity to outstrip the British iron industry, was caused by the adoption of the American labour-saving planing machine. One is naturally anxious to know what will be the outcome of the movement which involves not only changes in the minor departments but a rejuvenating of the entire system."

That there is no such home market in England is shown by the following contrast between agricultural conditions of America and England :—

"RURAL AMERICA.

"HIGH ESTATE OF THE FARMER.

"A prominent Chicago business man, discussing a few days ago the strides made in wealth in recent years, remarked that the farmer was getting more than his share of the prosperity. The remark was certainly striking. The poor agriculturist has for years been held up as a proper object for sympathy from town and country alike, and his elevation to a pedestal where he might excite general envy rather than sympathy is a severe wrench to the preconceived notions of the average man, and time would be necessary to reconstruct one's views of society on that new basis.

"But the important consideration is that the farmer's condition should have so changed as to make possible the utterance of the remark by a keen observer of men and things. A profusion of wealth scattered among the rural districts has potentialities almost too wide to grasp by the western business man. That the farmer is not penurious, as he is too often depicted, is the secret of the splendid trade which has blessed the prairie States for several seasons past. He has lately been cultivating a taste for the comforts and luxuries of life, which means not only good trade for the manufacturer and the merchant but also a continuation of that trade through the coming years. It is therefore a subject for general congratulation. Manufacture has outgrown agriculture in the whole country, and is making the more rapid gains in the west, but the aid which it receives from a prospering agriculture is yet too large to be anything else than an unmixed blessing. May the farmer's material needs never grow less."

"RURAL ENGLAND.

"RIDER HAGGARD'S INVESTIGATIONS.

"In the two handsome volumes of 'Rural England' (says the *Daily Mail*) Mr. Rider Haggard relates the story of his pilgrimage through the country districts of England, and presents the public with the lessons he has learnt.

"It is not a bright story. It tells of waste places and depopulated villages, of a decimated population, of a farmer class which struggles gallantly but daily decreases in numbers, and of a labour class which in some districts is disappearing, and in others has long since vanished.

"'Some parts of England,' Mr. Haggard writes, 'are becoming almost as lonesome as the veldt of Africa. The farm labourer is looked down upon, especially by young women of his own class, and consequently looks down upon himself. He is at the very bottom of the social scale.' The result of this is that the upgrowing generation of agricultural labourers, having no confidence in themselves, do not learn their business, and are unskilled in the arts of husbandry."

The painful contrast just presented between the agricultural conditions of America and England is no doubt to a very great extent brought about by various natural and artificial conditions existing in the two countries: cheap and virgin lands, the absence of landlords, and protection, &c., may be urged in argument in accounting for this wide divergence of rural prosperity, but when all these advantages have been duly weighed there still remain other factors in the case, since even in America, according to the presentment of the "High estate of the American farmer" (extracted from the Chicago paper, *Iron and Steel*), there was a time, and that not very long ago, when "the poor agriculturist was for years regarded as a proper object of sympathy from town and country alike." There can be little doubt that the main causes which have brought this change about are the enlightened selfishness of the great American railroad companies, the ingenuity of the implement makers, induced by close proximity to the responsive farmers; and the receptiveness of the farmer himself, for in America the anomaly of relegating agriculture (by far the most important industry in the world) to those who by their education and knowledge are least able to undertake it, does not seem to exist. All the handmaidens of science are called to her aid, without the slightest diffidence on the part of the farmers; and all the real slavery of the farm, which exhausts but does not elevate, is gradually but surely disappearing under the benign influence of adaptive machinery. The last arrival in the field is the gasoline engine, and the following newspaper cutting of 27th September, 1902, taken from the *American Agriculturist*, is a plain unvarnished account, given in simple farmer's language, of the extraordinary revolution which a 4-h.p. gasoline engine brought about on his farm:—

Gasoline Engines Lighten Farm Burdens.

G. A. Lazier, Illinois.—First prize winner in our contest for best statement of experience in use of Gasoline Engines on the farm.

I will endeavour to give your readers something of my experience with a gasoline engine on a farm of 320 acres. After over two years of constant use, I am convinced that when farmers in general fully appreciate the practicability of the gasoline engine, it will be considered as indispensable as any of the machines in common use to-day; as well to the small farmer as to the large stock raiser, the difference being only in the size of motor required.

My engine of 4-h.p. is located in a building 16 ft. by 20 ft. immediately adjoining the barn on the north-east corner. I had no difficulty with the insurance companies, their only requirement being that the gasoline storage tank be outside the building, which is the customary manner of installing. As I use an electric motor, there is no fire in the building.

The engine has a drive pulley on either side, one of which drives a heavy shaft inside the barn 26 feet long; the other a smaller one in the engine-house, from which a pump and a cream separator are operated. The pump-jack is connected with a short length on the end of this shaft, coupled with a clutch (from an old binder) and can thus be thrown out of gear when desired. By this arrangement work can be done in the barn and engine-house at the same time. The large shaft also projects out of the end of the barn so that we can run a corn sheller, saw, and other machines outside. Everything except the grinder is speeded to the pump. As pumping must be done every day, it can be done in connection with other work, thus effecting quite a saving in gasoline. I always pump while separating, and it is generally sufficient for the day. Inside the barn we run a grain elevator, by means of which one man can do the work of three at threshing time; a small grinder which grinds 15 to 20 bushels per hour; also a fanning mill, with which one man can clean seed or grain better than two could do by hand. The whole length of this shaft can be utilised as desired.

In the engine-house we run the pump, separator, churn, grindstone, emery wheel, and washing machine, which lightens the ever-dreaded washday—the washing being done entirely without hand rubbing. Do not overlook this. If you doubt whether the women folks appreciate this, just tell them some Monday morning that you are out of gasoline. These last four machines are run direct from the engine pulley, simply setting them in line. I have found the emery wheel of great service for keeping ploughs, cultivator wheels, &c., sharp and bright. The pump is an ordinary three-way force, fitted with 4½-inch cylinder, and is operated by means of an overhead jack (made from an old binder gear). Water is forced through underground pipes to two 10-foot tanks, each accessible from three yards. The engine renders a standpipe unnecessary, as water can always be pumped as needed fresh from the well, without waiting for wind, which in this locality generally fails during harvest and threshing season, when water is most needed and time is most precious.

The idea is quite prevalent that it requires an expert to keep a gasoline engine in running order. This is a mistake. Since mine was set out and started in March, 1900, I have never had an expert or mechanic touch it, and have never failed to make it do my work. I had no experience with engines whatever. Any man who can run a self-binder successfully need have no fear of a gasoline engine. It is no more complicated. Just study out the principle upon which it works, so that if it is not working properly you can locate the troubles. Oil carefully, keep burrs tight, and packing and battery in good condition, and you will have no serious difficulty. Too much cylinder oil and too much gasoline are common errors. My wife starts and runs my engine frequently.

As to cost of running, this depends entirely upon the amount and character of the work done. I think the manufacturers' estimate of 1 gallon per horse power for ten hours is approximately correct when applied to an engine in good condition and developing maximum power. I find, however, that it requires considerable more to do light work with a large engine than a small one. Much gasoline may be wasted through leaky packing and improper adjustment of air valves. Use as little gasoline and as much air as possible to do your work. My gasoline bill has been a trifle over 10 dollars (£2) per year (bought at wholesale, as all engine-owners may buy). I have also spent 4 dollars (16s. 8d.) during two years for oil and battery supplies. A large washing can be done for 5 cents (2½d.) at most, filling the water tanks meanwhile. Is it not a nickel well invested?

But someone will say, "Your outfit has cost a lot of money." Not so very much. The churn, grindstone, fanning-mill, and washing machine are the same we had when engine was purchased, only pulleys being added when needed. The elevator cost about 30 dollars (£6) for lumber, chain, and cups—the shafting and boxes being taken from old machinery—and I did all the work myself. The emery wheel is mounted on an old shaft, and cost 1·50 dollars (6s. 3d.) The grinder cost 15 dollars (£3), and cream-separator 65 dollars (£13), belting about 15 dollars (£3).

The above outlines the uses to which I have applied my power, but I have by no means exhausted possibilities. There are two more applications, which I have under consideration, both of which have been pronounced perfectly practical by experts to whom I have submitted my plans. One is an arrangement by which the hay tackle can be operated by power; a drum to wind up rope, and controlled by a friction clutch being used; the other is an electric lighting system, consisting of a storage battery charged by a small dynamo, run while doing other necessary work, and therefore adding nothing to running expenses. The gasoline engine will do much of the necessary work of the farm, lighten your burdens and those of the good wife as well, increase your income, save your time, and also furnish you with many of the conveniences and luxuries of the city; all of which tend towards placing farm life upon its proper basis and make it more attractive and interesting for our boys and girls."

Principles of Operation.

For those not familiar with the principles upon which the gasoline-engine works, the following explanation is offered. As nine out of ten of these engines operate on what is known as the four-cycle principle, we will consider this one only.

The parts of the cycle which, when combined, operate the engine are as follows:—

1. As the piston moves away from the head of the engine on what is called the "suction stroke" a vacuum is formed, and into the vacuum a properly proportioned mixture of air and gasoline is automatically admitted.

2. As the piston returns this mixture is compressed, and by means of the "hot tube" or of the electrical spark it is exploded just before the piston reaches dead centre. This is called the "compression stroke."

3. The expansion of the exploded gas now forces the piston outward, and it is during this stroke that the power is produced which is absorbed by the flywheels, and transmitted through them to any machine the engine may be operating. This is called the "expansion stroke."

4. At the end of this third or expansion stroke the exhaust valve opens, and the piston returning forces the burnt gases out. This is the "exhaust stroke." At the end of this exhaust stroke the flywheels have made two complete revolutions, and the four operations will be repeated "unless the governor prevents."

The Governor.

This ingenious piece of mechanism in the Master Workman is known as belonging to the "hit or miss" type, and is so beautifully adapted to the functions it has to fulfil that it is a very Harpagon in frugality. It keeps such a tight rein on the purse-strings that it proceeds on the "no work no pay" principle, so that if a four-horse power engine is only doing two-horse power work oil is only given it on that basis.

Yet, notwithstanding the frugal ways of its governor, the filial cheerfulness of the engine is so admirable that, when called upon to put forth further efforts, it just spits on its hands as it were, gives a little cough, and starts in straight away. Never was there such perfect understanding between parent and child as between the governor and little Master Workman. When the work is light, the engine revolves more rapidly, the balls of the governor fly out, opening the exhaust and closing the oil inlet valve; when the work grows heavier, the balls recede, the oil inlet valve opens, the usual explosions take place, and so the exertions of the engine are regulated by the duty it has to perform.

Ignition.

Upon the proper ignition of the mixture of the gasoline vapour and air, the whole success of the engine depends. This is accomplished by one or two means—viz., by that known as "hot tube ignition" or by "electric ignition."

In the former, the mixture of gasoline vapour and air is exploded by being brought into contact with a heated tube. In the latter the explosion is accomplished by the electrical spark, produced either by an electrical battery and sparking coil, or by a dynamo and sparking coil.

In the construction of these dynamos for the ignition of the explosive mixture, great ingenuity is often displayed in the creation of devices for generating a current in the electro-magnets at starting of sufficient strength to react effectively on the armature. In the Master Workman there are two speeds—one for starting, and one for running; the initial current of electricity being procured in the armature by the creation of a partial permanent field, thus avoiding the necessity for any separately existing batteries. The many clever attempts at aiming at a perfect dynamo for effecting electrical ignition are to be seen in the various American scientific publications.

The electricity generated by either an electrical battery or by a dynamo is passed through an induction coil, known as the "sparkling coil," and a spark is thus produced between the terminals of the coil within the engine. The spark is timed for the proper moment by an igniting tripper automatically regulated by the engine itself.

The Friction Clutch Pulley.

No description of the Master Workman would be complete unless the ingenuity of the friction clutch pulley were commented on. If anyone will look at his oil engine, if he have one, or will take the trouble of turning to any advertising circular he may have been provided with, he will see that the driving wheel or pulley is a fixture on the end of the driving shaft. In the Master Workman—an embodiment of thought in all its details—this is not a fixture. By means of a hand wheel protruding from the axis of the pulley, and which can be taken hold of whilst the engine is running, the driving shaft can be engaged, or can be disengaged, by simply thrusting in or drawing out this clutch wheel, which converts the driving wheel or pulley into a fast or a loose pulley. But the ingenuity does not end here, for by rotating the clutch wheel the driving pulley is held on to the driving shaft by partial friction, so that slip can be given at pleasure and the motion of the machine the Master Workman may be actuating can be increased or lowered at pleasure. Whilst we in Queensland have to be satisfied with crudities, it is the American of Chicago who is ringing the changes on ultimate refinements.

The "Master Workman."

No one making himself acquainted with the industrial condition of America through the *Scientific American* or other papers of a similar class can fail to realise how far in the rear Queensland is in matters involving oil power. Oil engines of a variety of designs actuated by the various light oils of petroleum are permeating the whole channels of industry, and so rapid are the changes in design that scarcely does an engine become popular than it is superseded by one offering greater internal or external advantages.

An oil engine being driven by sudden impulses produced by combustion of the oil vapour suffers from vibration usually to a considerable extent, necessitating the employment of great weight in the engines, expensive foundations, and loss of power when used for portable purposes, as it is well known that owing to violence of pulsations the full capacity of one-cylinder engines is not available when mounted on wagons for portable purposes. No more than half their power can then be utilised.

The elimination of the great disadvantages of vibration occupied the attention of Mr. D. E. Barnard, of Chicago, for some years (Chicago is the centre of the light-oil industry in America), and from this resulted the invention of the "Twin Cylinder Master Workman," an engine that is so completely revolutionising the trade in America that the Temple Pump Company, of Chicago, into whose possession the invention has fallen, although recently installing machinery for doubling its output, is not able to keep up with the home demand, and is selling its entire output for a month ahead.

The effect of the two cylinders is to divide the shock of each explosion, thereby lessening the violence of the vibrations. This is done so effectually in the Master Workman that the manufacturers are fully warranted in reducing its weight and bulk to less than one-half the weight and bulk of the lightest one-cylinder engine made. That this is so is seen by contrasting the weight of a 4-horse power engine of a class now being sold in this country; the former engine weighing 2,452 lb., as against 625 lb. in the case of the Master Workman. How perfectly vibration has been overcome is borne out by the trials made at the Interstate Fair at Trenton, New Jersey, United States of America, where fifteen exhibits of single-cylinder engines were made, and not one could bear a favourable comparison with the Master Workman, which was pronounced "the only truly portable engine there" in consequence of the absence of vibration.

No specially prepared wagon is necessary. Any vehicle on the farm capable of supporting the weight of the engine can be utilised, and thus the engine can be taken about to do much of the important work of the farm in irrigating, chaff-cutting, wood-cutting, &c.

The Temple Pump Company has been established since 1853, before most of the readers of the present article were born, and it is needless to say that unless such a firm had kept up to date in the furnace of American competition—Chicago—its affairs would have been long since consigned to commercial oblivion.

THE QUESTION OF FUEL.

Petroleum Distillates.

In anticipation of the arrival of the Master Workman in Australia, it became necessary to institute a series of inquiries *re* the fuel that this engine required, to see if such were obtainable, and whether the price admitted of the profitable employment of the engine. Now that the wave of hydro-carbon motors is just beginning to reach our shores, and advertisements in connection therewith are to be seen in our Brisbane papers, the subject of the distillates of petroleum should be of peculiar interest to us all. I take it for granted that everybody knows that gasoline, naphtha, benzine, and kerosene are all obtained from the crude mineral oil, petroleum, by a process known as fractional distillation, in which the petroleum is heated in a retort over a furnace, and the several fluids collected in a receiver as they pass over in accordance with their different degrees of volatility. For a long time very little use was found for the lighter distillates—gasoline, naphtha, and benzine; but within the last decade or so they have come into general use for motor cars and engines of various descriptions in almost every branch of industry. The kerosene engine, which from its supposed greater safety preceded the light oil engine, is now passing out of vogue in America, on account probably of imperfect combustion in the cylinder giving rise to a quantity of unconsumed carbon clogging up the piston with dirt. The lighter oils are free from this defect to a very great extent. But to return to the subject of the mineral oils sold in Australia. After corresponding with the various Australian Shale Companies with negative results, the sources of supply were ultimately limited to the Colonial Oil Company of Australia and to "The Shell Transport Company." The former controls the American output, and the latter that of Burmah. These two companies are not amalgamated, but are rivals. Let us hope they will long remain so, as these two companies apparently afford the only portals through which mineral oils can reach Australia, so tight is the ring which surrounds us. Having narrowed down the issues to these two sources, the necessary inquiries commenced; and no one who has not been engaged in similar work can imagine the chaotic confusion which exists in the nomenclature and the trade characteristics of these light oils. If it had not been for the assistance of the chemist in charge of one of the oil departments, I should have been blundering along still. His words are worth quoting, and are as follows:—"To boil the whole thing down, what is the specific gravity of the petroleum distillate required for use in motor? The name of the distillate is immaterial." This cleared the whole matter up for me. At the very outset of my inquiries I was handicapped by falling into a very pardonable error which added to the confusion. In the Temple Pump Company's circular I was informed that the Master Workman required gasoline of 74 degrees test. Associating gasoline with kerosene as being derivative of petroleum, I concluded that 74 degrees meant 74 degrees Fahrenheit, and indicated the flashing point, whereas it meant nothing of the kind. It indicated a definite reading on Beaumé's hydrometer, one furnished with a conventional scale for representing densities!

Beaumé is not used by the Shell Transport Company, who deal in specific gravities, so one scale has to be converted into the other, as dollars would have to be converted into pounds sterling. I will not bore my readers further with describing the ridiculous errors into which this misapprehension led me, but any chemist will appreciate how nonplussed I must have been in trying to reconcile these supposed flashing points with the corresponding specific gravities of the oils. However, the result has led to the possession of the following information regarding the petroleum distillates and their prices as supplied by these two companies:—

COLONIAL OIL COMPANY.

(1) Gasoline, 86 degrees Beaumé, specific gravity ·650 (not used for any engines I can discover).

(2) Naphtha, 74 degrees Beaumé, generally known in the trade as ·680 S. G. Spirit, sometimes it is called gasoline, motor car spirit, petrol, motorine, carburine, and boulvarde gas fluid. Price, 2s. per gallon.

(3) Benzine, Beaumé's scale 62, specific gravity ·729. Price, 1s. 2d. per gallon.

THE SHELL COMPANY'S PRODUCT.

(1) Naphtha, Beaumé 71 degrees specific gravity ·690. Price, 1s. 4½d. per gallon.

(2) Benzine, Beaumé 70 degrees specific gravity ·701. Price, 1s. per gallon.

The Temple Pump Company have intimated that the Master Workman can burn both gasoline and benzine, but for cleanliness gasoline (the ·680 spirit of the Colonial Oil Company) is to be preferred. The Shell Company's benzine is only 1s. a gallon, and if that can be used as a fuel the cost of running will be very small.

R. HOGGAN,

Lyra, S. and W. Railway Line, Q.

P.S.—Since writing the above article I have received the following letter from the Standard Oil Company of New York. Had I only gone to the source of the fountain at first, I should have been saved all the tedious investigations of the last few months. The letter affords a significant commentary on the ignorance of agents as to the nature of the goods that pass through their hands. The Queensland Railway Authorities are still under the impression that "Pratt's Stove Naphtha" is merely a substitute for gasoline: they have no idea it is the thing itself, and apparently there is no one to inform them on this point except myself!

[Copy.]

"26 Broadway,
"New York, March 31st, 1903.

"Mr. R. Hoggan,
"Lyra, S. and W. Railway.

"Dear Sir,—

"Replying to your inquiry of the 28th asking for a grade of gasoline 74 suitable for use in gasoline engines, we beg to advise that this identical grade of goods is sold by the Colonial Oil Company in Australia under the brand of "Pratt's Stove Naphtha."

"For your information we would say that the lighter products of petroleum are not sold by the flash test, but by the Beaumé (French scale of gravity).

"Yours truly,

"Standard Oil Company of New York."

DISCUSSION ON MR. HOGGAN'S PAPER.

Mr. W. D. LAMB (Yangan): Mr. Hoggan speaks of different kinds of motor power in farm work, but to my mind the kinds described by him do not go far enough. They are only ordinary portable engines, and what we want for farm power is a machine that has got traction power. What is the good of your having an engine to do the work if you have to keep horses to pull the engine about. I say to any farmer who wants to get hold of farm power, that he must insist on getting a machine that will move itself. If any of you get a fixed power on to your farm, before two days are over you will be sorry for it. Get hold of something that will move about. Use farm power for every branch of work on the farm, whether it is to drive your chaff-cutter or to pull down trees, and for the latter purpose a traction engine is as good a thing as you can get. For ploughing, too, in dry weather you can get over a considerable amount of ground with one, if you are using a six, seven, or eight disc plough. I again say insist on an engine, and it will most assuredly come, that will be made portable, and which can be made to work your farming machinery—an engine that will go into the bush for firewood, come back with it, and cut it up for you.

Mr. DEACON (Allora): Farm power is a very important subject, and there is no doubt that on the Downs gasoline engines will come into use to a very great extent. They have already been used for irrigation, and all sorts of purposes.

Mr. LAMB: We want a self-moving gasoline engine.

Mr. DEACON: I think Mr. Hoggan has been rather hard on the English manufacturers, and that there is a lot about them in the paper which is hardly correct. I also think there is a lot in the paper about American engines which is not correct, for I am of opinion that there is as good machinery made in England as there is in America.

Mr. LAMB also testified, from practical experience, of the superiority of English to American engines.

Mr. EWART (Brisbane): There are hundreds of things that can be done on the farm by a small engine such as that described by Mr. Hoggan. In the dairying industry, for instance, such a machine would be invaluable. It would turn a separator and do dozens of similar jobs. I saw a similar one at the last Brisbane Exhibition. It practically runs itself, and uses very little oil.

Mr. D. BROWN (Roma): Coming here as I do, to get all the information I can, I would like to hear discussed the question of motor power for ploughing. I have been told, to-day, that one of the officers of the Department of Agriculture, Mr. Brünnich, has received a motor-car engine from England, with the intention of having a motor car built locally. It has a 16-horse power engine weighing only 150 lb., and my interest in the matter is this: If such motor power were available for farmers at a reasonable cost, and I believe the price of Mr. Brünnich's can be so described, then it would be a grand thing in districts where, owing to recurrences of droughts, horses and horse feed are scarce. If we could get a motor car for anything like £100, I think it would be a great thing for the farming industry. It is, therefore, gratifying to know that the subject has been brought before the Conference, and I trust that something practicable will be undertaken by the Government. The Government might demonstrate the applicability or otherwise of this power to modern agriculture at either the Agricultural College or at the State Farms.

Mr. G. N. TERRY (Stanwell) suggested that these machines are liable to accidents as much as any other class of machinery, and the possibility was that, after purchasing machinery of this description, a slight accident might happen which might entail a delay of from three to six months before they could be got into working order again. With many new machines broken parts can only be replaced by sending to England or America, so that farmers should be careful that they do not invest in a machine that is liable to become practically worthless through a breakage at the season of the year when it is most wanted.

FOURTH SESSION.

TUESDAY, 7TH JULY, 1903, 7·30 P.M.

The first business was the reading by Mr. Deacon of the following essay:—

RIPARIAN RIGHTS AND THE NECESSITY TO DECLARE AND DEFINE THE LAW WITH RESPECT TO NATURAL WATER.

[By W. DEACON, Allora.]

By the term "riparian rights," I take it, is meant the rights that the towns, communities, residents, and landowners possess with regard to the natural waters—whether rivers, creeks, streams, or lagoons—in their locality. In view of the almost certain increase of irrigation, the importance of the subject can scarcely be overestimated. With irrigation, production in the State would be steady and continuous and of fair average profit, but without it the cultivation of nearly all kinds of crops must, from our irregular rainfall, be a precarious and often most unprofitable occupation. In some parts of the British Isles, although the aggregate rainfall is not excessive, they have at times continuous gloomy, foggy, rainy days, and production is limited or impaired by the want of the life-giving power of the sun, if not also by the paucity of electricity and electric action. Now, you cannot supply sun-power, but you can supply moisture and conduct it to your plants. As we have abundance of sun-power, if, by art, we can provide plant life with the moisture necessary when the rainfall is irregular or deficient, it is obvious that our position as producers will not be inferior to that of the most favoured countries. In view, therefore, of the probable storing and application of the meagre natural waters to the purposes of irrigation, it may not be a waste of time to consider what rights accrue to residents and landowners on the banks of these streams and lagoons, and whether any means should be devised to define and regulate them.

It appears, as far as I can understand the question, that at present the old laws of England are in force in this State as regards natural water. If so, in the case of a navigable river, the rights of property-owners cease at the water's edge, whether the property extends on both sides of the river or not. The river is, so to speak, a roadway, and generally under the control of a board or trust of some kind. The water, if fresh, can undoubtedly be used for domestic and general purposes, but cannot, I believe, be diverted for irrigation or otherwise. With regard to other rivers and streams not navigable, if an individual owns the land on both sides of a stream he really owns the bed of the stream as well, and, consequently, the boundary of land situate on one side of a stream only is the middle of the stream. But no individual can so deal with the water for mill, irrigation, or other purposes as to diminish the flow to the loss of landowners or communities on the stream lower down; nor can he so impede the flow as to throw it back on his neighbours higher up. It has little to do with the subject, but perhaps it ought to be mentioned, that a landowner or a community cannot also pollute a stream to the injury of down-stream owners. I have given the general, common, and, I believe, correct idea of British riparian rights; but how far they have been modified in this State by Government reservations in deeds of grant I am unable to say. My impresion is, however, that of late years the Government have reserved the beds of some streams.

There is nothing that leads to such tedious and expensive litigation as disputes about water rights, for loss and damage are often both difficult to prove and define, and the necessity for legislation on the subject is becoming a general impression in all the Australian States. In Victoria, recently, a deputation of farmers waited upon the Minister for the purpose of urgently impressing that necessity upon him. An earnest and noble attempt to deal with the subject was made in this State by one who is becoming to be acknowledged as the greatest living legislator and law-reformer in Australia, Sir Samuel Griffith, in 1887. When I chose the subject for this paper, I wrote to him for a copy of the Bill, and, with great kindness, he forwarded it, with the following letter:—

"Dear Mr. Deacon,—

"I have found a copy of the Water Law Bill, which I enclose. I have not applied my mind to the subject since; no doubt should find much to criticise in the proposals contained in it. But I think it is a great pity that Parliament did not consider the matter. I hope the Bill will be of use to you.

"Yours, very truly,

"(Signed) S. W. GRIFFITH."

The preamble of the Bill commences—"Whereas the common law of England now prevailing in Queensland with respect to natural water is unsuited to the circumstances of the colony, and it is expedient to amend such law," &c. There is no doubt about that. It was expedient to amend it then, in '87, and it is certainly much more expedient to amend it now.

Clause 4 says: The water in every natural watercourse, lake, or lagoon is the property of the Crown and not of any private person, and is dedicated to the use of the public, subject to such conditions as may be prescribed by Parliament from time to time with respect to such use.

Clauses 5 and 6 deal with the right to take water from the streams, &c. Persons who are lawfully entitled to access to these waters may take them (1) for domestic purposes, (2) for stock. In cases of necessity the use of water for domestic purposes "shall have priority over that for stock." But for no other purposes may water be taken as above, except with the consent of the Crown or its authorised agent.

By clause 7 all persons and corporations who are lawfully entitled to access to water, whether in a natural watercourse, lake, or lagoon, or not, have a right-of-way across public and private lands for the purpose of constructing ditches, flumes, aqueducts, &c., subject, of course, to compensation for land taken and damage occasioned.

Sir Samuel divides watercourses into two kinds—main and minor watercourses. I shall not deal with his definition, for it is quite possible that, for irrigation purposes, he would now very considerably modify it. The soil of a main watercourse is defined as belonging to the Crown, and in deeds of grant alienation must stop at the bank. The soil or bed of a minor watercourse he would, however, alienate in the old way, consequently it can be seen how important is the point. There are very few watercourses except gullies the soil or bed of which I submit should be alienated.

Possibly, for a few miles from the head or source, a stream might be deemed a minor watercourse. Sir Samuel, however, allows 50 miles along its course or 25 miles in a straight line for the purpose. The object of the definition of main and minor watercourses becomes obvious from other following clauses. Clause 13 says, "No private person may store water in a main watercourse, or intercept the flow therein or divert the flow of water therefrom, without the sanction of the Crown." With regard to minor watercourses a clause confers these rights upon the proprietors of the adjoining land, but the Crown may forbid their exercise. Provision is also made for other limitations in certain cases. When the watercourse runs through the land of two adjoining proprietors, one cannot exercise the rights without the consent of the other. Certain rights of all proprietors of land situate on these minor watercourses, allowed by common law, are also allowed and specifically set down. The proprietor of lower land may not obstruct the flow of water to the prejudice of proprietors of higher land, and, *vice versâ*, the proprietor of the higher land must not increase the flow to the prejudice of the proprietor of the lower land. But he can make dams so long as the rights of other proprietors are conserved and reasonable precautions are taken to prevent them bursting and damaging the properties below. He cannot divert water from the watercourse for the purpose of storage without the consent of all the proprietors below him on the watercourse, within a distance of 25 miles measured along the bed of the stream. Should the proprietor of land, bounded by one side of a watercourse, desire to construct a dam on such watercourse, and the proprietor of the land object to his doing so—and should the proprietor of higher land desire to make certain arrangements for water storage, and any proprietor on the lower land within the distance of 25 miles object in either of such cases—one or both of the parties may refer to the water authority to be established, which shall be able to make an order as binding as an agreement between them.

The proposed "Bill" then goes on to define the water authorities to be established, but I should imagine Sir Samuel Griffith would not now, with the advance since made in local government, adhere to them. Finally, the Bill repeals all laws and rules inconsistent with those contained in the measure.

Now, I think I have taken out the heart of the Bill, though, doubtless, I have left some valuable provisions unremarked. I must apologise for going into it so minutely; but, as far as I am aware, it is the only comprehensive attempt ever made in the State to deal with what will soon be a burning question, "cause feuds amongst settlers" and endless litigation. It is really a noble attempt to apply the principles of conciliation and arbitration to water rights. It must be patent to this Conference that, if we have a return of dry seasons, irrigation plants on our creeks and rivers will be so multiplied that the country below them will be in danger of becoming a waterless desert, and that there will not be sufficient water for its two first uses—viz., domestic purposes and stock. I think it necessary to repeat that I am in favour of irrigation, but it must be regulated. In cases where there is a large expenditure, "trusts," undoubtedly, should be established; but where no storage for the public is contemplated, all "natural water," rivers, creeks, &c., should be under the control of "local authorities" or joint local authorities, with powers conferred upon them similar to those embodied in Sir S. Griffith's "Bill," and reserved for the Crown and the water authorities. I do not believe in the multiplication of "boards." Macaulay once said of a board of which he was a member—"All boards are bad, and this is the worst of boards." He was referring to boards nominated by the Government. I believe in all local matters as far as possible being concentrated in the hands of one elected local authority. The more power and responsibility you give to these authorities, the more interest will be taken in their election, and the abler men will be elected.

In conclusion, I would say that I am greatly indebted to Sir Samuel Griffith for looking up and forwarding to me, at my request, his 1887 Bill, and I should not be surprised if this Conference, in the end, will feel that they are indebted to him in an even larger degree.

I give notice of the following motion :—

That this Conference requests the Government to introduce into Parliament "A Bill to declare and define the law with respect to natural water."

Mr. W. Ewart then read the following paper, on behalf of Captain Clatworthy, of the Nundah Horticultural, Agricultural, and Industrial Association :—

DROUGHT, DRAINAGE, AND SUB-IRRIGATION.

[By Captain W. Clatworthy.]

Owing to the unprecedented drought of the past few years, the questions of water conservation, irrigation, and drainage have been the leading topics of the day. It is not every farmer or gardener who has an abundant supply of water to work upon ; therefore the study of economising moisture is of as great importance as is that of irrigation, and this may be obtained by judicious drainage, for by the aid of earthenware pipe-drains the lower soil becomes sufficiently loose and open to allow a circulation of air, and the deposit of atmospheric vapour will keep it well supplied with moisture at a point easily accessible to the roots of plants.

The extent to which plant life is affected by drought depends, other things being equal, on the depth to which they send their roots. If these lie near the surface, they will be parched by the heat of the sun.

If they strike deeply into the damper subsoil, the sun will have less effect on the source from which they obtain their moisture, and nothing tends so much to deep rooting as the thorough draining of the soil.

In a healthy well-aerated soil any of the plants ordinarily cultivated in the garden or field will send their roots far below the parched surface soil.

The idea of expense is greatly exaggerated, and what is considered economy is in reality the most wasteful extravagance of time and money. Only let the farmer calculate the cost of cultivating the land on which he loses his crops, year after year, either through drought or too much wet, and he will find that, without counting the value of the crops he has lost, he will have paid for merely working the land (from which he has had no return) sufficient money to have drained it several times over.

As the various soils and nature of the country differ so widely, no definite system of drainage can be laid down or sizes of pipes recommended.

Sub-irrigation v. Surface Irrigation.—In sub-irrigation the moisture is applied to the roots of the plant and the surface is protected from becoming caked and cracked, which is the case in surface irrigation, and the small fibrous roots of plants are seriously injured by the moisture and extreme heat of the sun, whereas in sub-irrigation the minimum amount of water is used, as none of it is evaporated by the sun, but is, by the capillary attraction, brought near the surface, which is kept open and free to the air.

In my experiments I have used for the purpose of sub-irrigation and drainage combined a 2-inch percolating, porous pipe made in 18-inch lengths, which serve admirably the double purpose of irrigation and drainage for small areas ; and as irrigation without drainage is comparatively useless, and sometimes even dangerous to crops, there is a considerable saving in cash and labour, as one set of pipes will accomplish the dual object. The temperature of the soil is improved in cold or wet weather by opening the ends of the pipes, thus giving a current of air underneath the ground.

By the use of these pipes the land is kept clear of all obstructions such as open drains or sluices, thus allowing the cultivators to keep a clean and loose surface, which will act more favourably on the soil and plants, and last, though not least, when these pipes are once properly laid down they will serve a lifetime, there being no probability of their blocking, as the pipes are made in such a manner that the pores cannot very well be closed, and neither earth nor sand can possibly get into the pipes.

The number of pipes per acre, laid 15 feet apart, is about 2,000, the cost of which is 10s. per 100 feet at the factory, making the total cost for pipes alone £15 per acre.

DISCUSSION.

Mr. G. MARTIN, M.L.A.: Having been for fourteen years cane-growing in low country, I would like to make a few remarks on the last paper read. I recollect that some years ago Mr. Edward Knox, when writing to farmers on the subject of the cultivation of cane on low localities, stated that what the cane suffered from was lack of drainage. Some years ago we had what was known as gumming in cane, and that undoubtedly started on the farm kept by a dilatory farmer, who did not drain his land, and for the same reason that disease has often started in localities that have not properly been looked after. If the roots of cane grown on land that is ill-drained are examined with a microscope at certain times of the year—that is, after periods of excessive rainfall—it will be found that the outer covering of the roots is completely eaten away. There are two cells in all canestalks—a sap cell and a juice cell; and insects get access to the sap cell. Getting up into the cane, they live on the saccharine in the sugar cells, and, in my opinion, as an old sugar-boiler, the gum in cane is nothing more than the excrement of these minute insects. It is all brought about, I think, through lack of sufficient dramage, and I can remember a series of experiments conducted by the Colonial Sugar Refining Company to impress upon farmers the necessity for draining low-lying land. Through drainage and the growing of green crops, they altered an extent of soil from a cold clay to a kindly friable loam. Captain Clatworthy's is one of the most valuable papers that has yet been read at this Conference, as it deals with one of the most important questions affecting agriculturists in Queensland. In some parts of the world, whole swamps have been reclaimed, and what was once useless country in Mildura has been turned into some of the best land in Victoria, and all through drainage and irrigation—processes that release the latent qualities in land, and allow to the soil the free play of the atmosphere.

Mr. F. W. PEEK (Chamber of Agriculture): In connection with the question of sub-drainage, I may say that during last year I paid, along with some other gentlemen, a visit to the garden of the writer of the paper, and we there had a demonstration of what he has done by adopting the pipe he is now advocating. The pipe appeared to be an ordinary drain pipe. At a previous Conference, Mr. Lee, of Zillmere, brought forward a paper dealing with drainage and irrigation, and he gave his opinion on what he considered a good working pipe. I also saw this pipe at the same time. Mr. Lee, in his invention, had pipes perforated with holes, and it was pointed out to us on the occasion of our visit to Nundah that these holes were subject to clogging, and, therefore, ultimately, for both drainage and irrigation purposes, the pipe became useless. But in Captain Clatworthy's case, by the admission of some combustible matter, the grains of sand would not clog in it. We saw a plat of beans grown with the use of the pipes and a patch without, and the demonstration very conclusively showed the value of the pipe for both irrigation and drainage. The comparatively low cost of the system should place it within the reach of any gardener or farmer on a small scale.

Mr. W. D. LAMB (Yangan): I have dabbled a little in iarigation myself, but, unfortunately, my neighbours made a fuss about the water, so to live in peace I abandoned my schemes, and they are still in abeyance at the present time. The sooner the Government brings in a Bill dealing with water rights the better it will be for all concerned. There was nothing but growling the whole time the dry weather was on about one man taking water that another thought was his. I really would like to know what is the law on the subject and what is not, and if it were generally made known it would dispel a good deal of the ill-feeling that is sure to occur when the next drought comes. Except for a garden, I rather think Captain Clatworthy's drainage scheme is beyond the reach of the ordinary farmer.

Mr. P. McLEAN (Agricultural Adviser): The question of irrigation is not a new one, although it is certainly comparatively new in our State. I can thoroughly understand the principle on which Captain Clatworthy works, and it is a sound one, although perhaps expensive. The question has been gone into largely in America, where irrigation has been adopted in many places, and those who wish to get information on it are advised to consult a work known as "The New Agriculture." When Mr. Lamb and myself were in Victoria recently, making inquiries on the subject of seed potatoes, a gentleman who had been in Queensland at one time kindly offered to take us to a place where, as he stated, we would see potatoes grown in earnest. Arrangements were made, and we went out to what, at one time, was practically a swamp on which nothing would grow. The Government, however, put a drain through that land, and on it they levied a water rate. The land was sold by auction at from £25 to £35 per acre, and potatoes were taken off it to the extent of 16 tons to the acre. Sixteen tons, we were advised, was not an uncommon yield, and, in fact, we witnessed the digging of what promised to be a 10-ton per acre crop. Immediately below where the potatoes were growing, there was nothing but what you would call raw sand and pure peat bog on the top of it. In fact, the original reeds that had been growing in the swamp were coming up here and there among the potatoes. But the main facts were that the land was yielding from 10 to 16 tons of potatoes to the acre, and that the value of the land (from £25 to £30 per acre) had been increased, owing to the action of the Government in putting the wide drain through the land and levying a water rate to pay for the expense.* Of course everybody admits the advantage of draining, but the question to men of limited means is, How are they going to accomplish it? Captain Clatworthy's is a much more enlightened system than that adopted in America, where they used stone drains—that is, drains, cut out and filled with stones. The stone area was filled with water, but it was only a question of time before roots blocked up those drains. In the system described in the paper, however, that would not occur, and it is a system, moreover, that answers the purposes of drainage, irrigation, and the aeration of the land.

Mr. G. Turner (Bowen): The Fruit-growers' Association in my district holds that no man can hope for any success in the industry unless he is prepared to irrigate. Drainage, however, does not trouble us because we are particularly well situated. I certainly think the idea of a porous drain pipe is one worth attending to. Our system is to raise the water by windmills and to conduct it to the trees by a series of pipes, but these constantly get out of order, they overflow, and as you walk about you harden the surface, thereby increasing the necessity for constant cultivation. An orchard laid down with porous pipes should pay in the long run, and the returns from an orchard would warrant an expenditure up to £15 an acre, if that would cover it. I should like to know where these pipes could be obtained. In the Bowen district I recently took the trouble to compile for Dr. Maxwell a return, and, taking a radius of 3 miles from the water reserve on the Don River, I made a note of sixty places where we could obtain water at from 15 to 20 feet. Our only difficulty is the best way of applying it, for we certainly waste a lot of energy in the distribution of the water. Dr. Maxwell has promised to pay us a visit, and I think his spending a couple of days there would be of the greatest value to us.

Mr. R. Weedon (Nerang): At Nerang Creek there was a large lagoon lying back from the river. This lagoon appeared to be fairly big and to have a fair quantity of water in it. The land between the river and the lagoon was originally scrub which was felled, and the resulting country furnished land for some splendid farms. The owners of these farms, however, were always troubled by the water rising from the lagoon, so the divisional board borrowed money and laid a drain through the land. The result was practically similar to what Mr. McLean has described as taking place down in Victoria—namely, the reclaiming

* The same thing can be seen on Mr. Nicholls' farm at Petrie's Creek, Nambour. A tea-tree swamp is drained. Potatoes thrive in it, and the swamp reeds could be seen growing amongst the potatoes.—Ed. *Q.A.J.*

of a beautiful quality of land, and land that had the additional advantage that it had no stumps in it. The trouble arises when careless people have lighted fires in it, for the whole of the peaty surface of the swamp burns, and when it does so, instead of 6 feet of beautiful soil, the fire leaves nothing but ashes and sand. There were several fires which burnt beneath the couch grass, and horses sometimes fell right through the top crust of the soil—all that underneath being burnt to ashes. The immediate surface seldom gets burnt, but when it is broken through immense columns of smoke will be seen rising.

Mr. EWART acknowledged the kind things that had been expressed concerning Captain Clatworthy's paper. The Virginia Brick and Tile Works, Virginia, near Brisbane, was the firm that made the pipes mentioned in the paper, and he understood that the proprietors of the works would be glad to furnish anybody with information concerning them.

The CHAIRMAN: Mr. Turner mentioned that Dr. Maxwell had not made a stay at Bowen, and that he could give the growers there some valuable information if he did. Mr. Turner appealed more or less to me, but I may point out that Dr. Maxwell is, by the wording of the Act under which the Bureau of Sugar Experiment Stations is constituted, practically independent of the Minister. If we employ an expert of high standing, he is supposed to know his business, and undoubtedly Dr. Maxwell does, and he also is given full liberty to act independently of any political considerations whatever, and to do the best he is able to do, in his own way, to promote the industries and interests which he is paid to promote. Dr. Maxwell makes his own arrangements in connection with the visiting of various places. Probably, as Mr. Turner knows, he is employed under that Act, and half of the sum which is required to carry out his department is derived entirely from a special levy on the sugar-growers. The position is this: Dr. Maxwell was engaged, by the State Government, of course, but the expenses are defrayed from a levy on the cane-growers. Everyone who grows cane has to pay. His contribution is added to certainly by a subsidy from the State. Dr. Maxwell is perfectly willing to render what assistance he can to other industries, provided he has the necessary time. I am happy to say I thoroughly appreciate the value of Dr. Maxwell's advice, for I look upon him as the most trained scientist in Australia. If he is detailed on a special visit to the Toowoomba district, or to the Gatton College, or to any other place where his services are required for any purpose other than that which he contracted for, we charge that to the consolidated revenue. He has scarcely yet finished the work for which he was originally engaged, but he is occasionally able to devote a portion of his time to some other purpose. For instance, if he takes some time in visiting a district, we should consider it a proper thing that the arrangements of the Sugar Bureau should fit in with that visit. I have no doubt that Dr. Maxwell will be glad to call in at Bowen, and the fact that he is desired to do so I shall be very glad to put before him. But, practically, he must decide such matters himself. He is the most able man we have got, and it would be folly for me if I were to go and control a man who is infinitely my superior in technical knowledge. He is given a free hand wholly in the interests of the agriculturists. With regard to gumming, I may make the remark that I have not been able to ascertain what is the precise cause on which gumming depends. There are divers opinions, as there always are, unless there is absolute certainty. Some think gumming is caused by growing the cane in conditions which are not congenial to it. The cane is a native of, and flourishes best in, a climate such as the Cairns and Geraldton climate, which is much hotter than where cane is grown in many parts of this State. Some say that if you grow cane away from its natural habitat that disease will appear, and that the only remedy then is to get fresh cane from a latitude where cane flourishes best. As for riparian rights, that is a matter which, in our present conditions, should have the attention of the Government directed to it. Our great difficulty is, not so much to deal with water as to find the water to deal with. I think you will imagine—at any rate, I do—that as Sir Samuel Griffith, who stands probably at the head of the legislative scale of Australia, did not pass that Bill that has been mentioned, but merely brought it forward, it must be a somewhat difficult matter to deal with. I fancy that, in endeavouring to legislate on the matter of riparian rights, the best experiences in the way of legislation are the experiences of some of the Western States of America; for there are a great many States there which are badly off for water, and in which legislation on the subject has taken place. I dare say a fresh endeavour will be made to deal with the question in Queensland, but I say decidedly it is a most difficult one. With regard to the Water Authorities Act as embodied in the Statutes, I think that Act does not apply at all. It seems to be one in which it is possible, without the aid of a municipal authority, to deal with water reserves and to deal with water works. It appears to me to merely provide a means where, outside a municipal authority, it will be possible for persons to establish works for the conservation of water and for selling that water; and so in no way would it be applicable to the question on which Mr. Deacon desires legislation; but a difficulty must arise in the case of farmers in places where there is a small supply of water who want to use that water for irrigation purposes. For instance, at the Gatton College some time ago, when the drought was very severe, a small pumping plant was erected to take out some 15,000 gallons of water per hour. It was estimated that this was only a tenth of the water that could have been taken, but it was not considered desirable to take more than a tenth, because there were other people besides those who live at the College, and we could only take more than that tenth by depriving other settlers of their proportion. There were two or three other pumps erected on the same creek, and although two or three, or even four, people might take nearly half the water, if four or five followed their example, then the settlers lower down would not have any water at all, and, therefore, there must be some means of protecting the rights of those who live on a stream. When you come to a common demand for water, there would be in any case, whether you have legislation or not, a very great difficulty. But without legislation there would be more. In the opinion of Dr. Maxwell it is almost impossible to hope for any extensive use of water from the natural streams, for, as you know, there are few streams which flow at all in bad seasons. Our hopes must, therefore, be principally based upon the vast supplies of water which undoubtedly do exist in the deltas, and which can be reached by wells which will not interfere with anybody's rights. These underground supplies occur in the valleys of creeks, and the most striking example of the value of tapping such supplies is the Burdekin delta, where the water, we suppose, percolates from the river in time of flood and is kept in a kind of underground reservoir. But what occurs in the Burdekin delta and what occurs at the Burnett delta occurs in hundreds of cases in the valleys of creeks and rivers—at Mackay and on the Don, for example. In all there will probably be found a common characteristic. Water may be found in those places under such conditions as will enable a man to use it without any fear of some legal document which will cause him to give it up.

Mr. Deacon's motion that the Conference requests the Government to introduce into Parliament a Bill to declare and define the law with respect to natural water was referred to the Resolutions Committee.

DISTRIBUTION OF SEED WHEAT BY THE DEPARTMENT OF AGRICULTURE.

Mr. Wm. Deacon (Allora): I beg to move a vote of thanks to the Department of Agriculture for the supply of seed wheat, &c., to the farmers, and also for the care and energy its officers have displayed in its choice and distribution. This is a matter that affects us all on the Downs and, I believe, in some other parts of the country as well. The public attention may have been called to it, and many people may have interested themselves in requesting the Department of Agriculture to supply seed wheat, but after all there is a way of doing things well, and there is a way of doing things so that they are a farce. But I maintain that the Department has done this thing well. They, so to speak, have put it in the power of every farmer to grow wheat if he chooses to do so. No man who wanted seed wheat has been refused. When you compare the manner of the distribution of the seed wheat in this State with the manner in which it was carried out in New South Wales and Victoria, everything is in favour of our State. In fact, in this particular business, Queensland stands at the head of the other States in every way. It is quite possible that in one way this drought may have been a blessing in disguise. Mr. McLean and Mr. Lamb went down South and chose a lot of new seeds. The quality of the seed was undeniable. I believe they got the best kinds procurable in Australia, and I, therefore, beg to move a vote of thanks to the Department, and particularly to Mr. McLean.

Mr. PEEK (Chamber of Agriculture): I have great pleasure in seconding the resolution. I know Mr. McLean is an advocate for anything that will benefit the farmer. I have also to thank the Minister for the way in which he met our request for an extension of time to those farmers who had not the ready money to pay for the seed.

Mr. W. ATKINSON (Danderoo): I have taken some prominent part in this transaction, and I believe that the whole of the wheat farmers on the Darling Downs have to thank the Department for taking up the subject of supplying seed wheat. There has been a good deal said about the price we shall have to pay, but my opinion is that we would have had to pay much more if the Department had not stepped in. The thanks of this Conference, and of the whole of the wheat farmers of the State, are due to the Agricultural Department, and I have therefore much pleasure in supporting the resolution.

Mr. G. MARTIN, M.L.A. (Childers): You are aware that wheat is not grown throughout the whole of Queensland, but the whole of Queensland has suffered through the drought. We have been very modest up our way in not asking for seed, but, at the same time, now that the Department has supplied seed wheat, I would respectfully make this suggestion to the Minister, especially from what he has said to-day, that he believes that it will be a benefit to us if we get fresh cane plants from the tropics, the natural home of the sugar-cane. Seeing they have supplied the Downs farmers with seed, I ask, Will the Department take into consideration the question of assisting us by getting cane from the tropics? We do not ask them to get it for us for nothing. And, on behalf of the dairymen, I further ask, seeing that the dairymen have also suffered from the drought, that the Minister take into consideration the question of supplying stud bulls.

Mr. J. GILLAM (Clifton): Being a representative from one of the largest wheat-growing districts of the State, I strongly support the resolution. The farmers in my district are exceedingly thankful that the Department took action in the way that it did. I was fortunate enough myself to get local seed before the other came, but I know from my knowledge of the people on the Downs that there would not have been half the quantity of wheat sown this year if it had not been for the Government obtaining wheat from the south. I, too, have much pleasure in supporting the motion.

Mr. S. L. JONES (Roma): In our case there has not been the slightest doubt that we would have had no wheat at all but for the action of the Department. Through the action of the Government we shall have something like

30,000 acres in this year for the Maranoa district. That in itself speaks well for the Government and also for our associations, for I think we have to thank them largely for the manner in which they presented the urgency of the position before the Government.

Mr. H. A. Tardent (Toowoomba): As representing one of the Darling Downs societies which has been benefited by the action of the Government, I have been asked to say a few words on the subject. My society has recently passed a resolution thanking the Minister and the Department for procuring the seed. About the handling and distribution there is perfect unanimity, as there is also that Mr. McLean and Mr. Lamb managed the business in an admirable manner. The all-round opinion is that the wheat selected is of the highest quality. The cleaning machine which was in operation at Redwood's malthouse is the most up-to-date machine in Australia, and I hope that the action of the Department will be only a beginning of something larger. There are many things which are better done by the State than by the individual, and many which are better done by the individual than by the State. If we want to advance our agriculture, let us combine. Let the State help us, and let the farmers help themselves. I have very much pleasure, indeed, in supporting the resolution.

Mr. E. Adams (Rockhampton): I heartily support the motion. In our district we never asked for anything. We do not bother about cane, but, as dairying is progressing in our district, I would like to state that if the Department sends a stud bull up into our part his services will be eagerly availed of.

The Chairman: The Department is very glad indeed to find that its efforts are appreciated, and that you have referred in such kindly terms to the business-like manner in which the transaction has been carried out. The action of the Government on this occasion is not of the kind commonly described as socialistic. It has been kindly said that, however the action was brought about, it was beneficial, it was justifiable, and it was well conducted. But I wish to point out that, whatever the Press may have done or said, whether a portion approved of it, or disapproved of it, if you please one paper you do not please another. The matter was brought about by the representatives of the Darling Downs, who waited upon myself personally in connection with the threatened dearth of seed wheat. Viewing the position with some apprehension, because it was evident that, if the Downs farmers were unable from any means to get a sufficient quantity of wheat, it would be a dire calamity to the State, I spoke to Mr. Philp on the subject. I looked upon it, not as one of those pieces of business which we should be called upon to perform annually, but, taking the view that it was an exceptional time and justified exceptional measures, I considered, and I had the concurrence of the Premier, that it was one of those cases which we might class as outside of ordinary events, and take exceptional action on accordingly. We came to that agreement, and told the members of the Darling Downs that we would lend a favourable ear to their wishes, and that we would do the best we could to provide some means whereby wheat of a fitting character would be provided. It should be stated that the members referred to did not, in the first instance, ask the Department to go abroad for seed. Seeing there was likely to be a scarcity of seed wheat, and seeing further that the millers were grinding into flour the wheat which had been grown in the State, these members thought it desirable that this wheat should be made available to the farmers to plant instead of having to go beyond the State for seed. Since there apparently was a risk of all the seed wheat disappearing and the farmers being compelled to get seed wheat from some unknown source, we thought it desirable to take exceptional measures to secure the wheat which was in the possession of the millers. It was, therefore, thought that the Government should get possession of the Queensland-grown wheat in the hands of the millers. Afterwards we thought it not advisable to buy wheat from the local millers. Transactions of that kind are more or less of an equivocal character. The Government could be charged with favouritism to millers or of trying to curry favour with them. Therefore, we determined not to give money at all, but to offer to supply the millers, whose interest it was that the farmers should have material to grow more wheat, with South Australian wheat for an equal quantity of locally-grown seed. That offer was ultimately accepted. We soon discovered that sufficient seed wheat of a suitable quality was not obtainable in Queensland, and it was then decided to supplement our local acquisitions by a large quantity, carefully selected in South Australia. Our action, I think, should not be repeated unless in a similar emergency, which I trust will never happen. It would not be considered wise that we should give farmers on the Brisbane River new starts every year, because occasionally they are given assistance after times of flood. The credit of choosing the wheat rests with Mr. McLean and Mr. Lamb, whose services, I think, we were fortunate to secure. But after all I think a Minister, even if he does very little himself, but yet is able to know a good man when he sees him, and appoints him as his adviser, is entitled to a little credit. The wheat was sent to the malthouse of Mr. Redwood, of Toowoomba, because he had much better appliances and a much more convenient place than anyone else who could be discovered. This action did not receive universal approval, because there were others who would have liked to have had a hand in the transaction, but we determined, in consequence of the unrivalled conveniences afforded by that particular place and its plant, that in the interest of the farmers it was our business to go to Mr. Redwood's establishment. With respect to the purchase made in South Australia, Mr. McLean and Mr. Lamb took the utmost pains in the selection of the seed. They went over and scoured the whole country. They had the wisdom of the serpent as well as the suavity of the dove. They did not give a hint of what they were doing. They went *incog.* They did not let the people of South Australia suppose they were emissaries of a Government. They bought the wheat before very many knew anything about it. They secured it at as low a price as possible—obtained the best seed that it was possible to obtain. In this matter we were ahead of the other Australian Governments, and therefore had the advantage. I consider that to Mr. McLean and to Mr. Lamb very much credit is due; and I believe that to Mr. McDermott also a lot of credit is due. In transactions of this nature there are so many possibilities of making mistakes that I am exceedingly pleased to be able to think from what you say, and from what others say, that we very probably managed the business in about as good a manner as it was possible to do, and that we have been fortunate enough to have made no mistakes. Although Governments are always supposed to be continually making mistakes, it is allowed that we conducted an important business, and a new business, in a manner which is satisfactory to all concerned. And I look upon the resolution just adopted as a genuine expression of the opinion of the growers. However pleased we are with the transaction, before we engage in other transactions of a similar nature, it is just as well to see how we shall be satisfied in twelve months or two years. We were informed to the effect that probably 90 per cent. of those desirous of obtaining wheat would pay cash. We found, however, that only a comparatively small number would pay cash, although we charged interest if they did not. I hope and feel tolerably certain, the more particularly as the season promises to be a favourable one, that the great majority will, when the time comes and they get their harvest, be able to settle up with the State for the accommodation that has been given. That really will be to all concerned, I am sure to none more than those present, a satisfactory conclusion of the arrangement. But I may say that, in South Australia, perhaps in New South Wales, where advances have been made in somewhat similar circumstances, the larger part of the money is still owing. But I do not think it will be the case here. A gentleman has asked that, having done something, why should we not do something else? If a Government once does a thing, that Government is constantly embarrassed by requests to do a similar thing again. My friend only wants the Department to supply stud bulls, but the Government has to discriminate. Although a Government discriminates, it is very difficult to get people who have an interest in a matter to view the case from the same standpoint. They say, "You can attend to that transaction, but you cannot attend to this, and why?" We made a transaction in the matter of cereals, for reasons which are satisfactory to the Department. We thought we were justified in doing it, but it does not follow that we must supply everything—everything that everybody wants. If we stepped up in this emergency and supplied farmers with credit for twelve months, and obtained for them seed wheat, it does not follow that we should be called upon to supply the farmers with everything. There a difficulty with regard to the matter of supplying stud bulls. There is an equal difficulty in supplying cattle or seed potatoes. It is true that a dairyman may have lost his cows, perhaps his entire herd, and I am sorry to say that I know some have. The dairymen say, "It is very hard that those who have lost their wheat crop get seed wheat, but the Government will not give us bulls." But there are things which, on the whole, it would be too expensive and too difficult even for the powers of a Government, and we have been compelled to say that, although great losses have been sustained by most deserving people, we cannot go far beyond our ordinary action. Cane does not, in my mind, stand on the same footing as cereals. If it is asked that the Department shall import new varieties of cane, if it is asked that they shall experiment and try to grow new plants from seed, then that is precisely what the Department is doing at present and has been doing for a considerable time. Some years ago we introduced a good many varieties from New Guinea. We cannot introduce them now because an embargo is placed upon New Guinea. We have to be careful of the risk of importing new plagues. We already have all sorts of plagues which we introduced in innocence All kinds of pests have come here from the civilised and uncivilised world, as everybody knows who is growing plants or who is dealing with fruits. The great trouble with most of our fruits and many of our plants is, not to grow them, but to keep away pests from them when they are grown, so that they may not be made utterly useless. The Department now takes every care in the importation of plants, and, seeing that the risk of importing some new disease is greater than the probable advantages which will be derived from importing some new varieties of plants, there are certain countries from which we forbid the introduction of all plants. A short time ago, to the astonishment of everybody, the coffee-leaf disease broke out in New Guinea. The immediate result was that we forbade the importation of any plant whatever from New Guinea. We are compelled to act in that way. So, if we want to introduce sugar-canes from any country where cane is grown profitably, we find that we are stopped, for practically every country that does grow cane in quantity is a prohibited country. We have experiments, however, going on under the direction of Dr. Maxwell, who is using scientific knowledge in the production of new cane plants. Those plants when they are obtained from seed are new varieties, for practically every plant obtained from seed has an individual characteristic. Those new plants that are raised are carefully watched and tested, and every care is being taken to discover varieties specially suited for certain localities, climates, and conditions. With regard to stud bulls, I have to explain that when the late Mr. Chataway was Minister, and I take it he was a very capable Minister, he did try the experiment in some two or three cases of introducing into certain districts Government stud bulls. Mr. McLean will tell you the result of the experiment was not as satisfactory as it might have been. People did not make use of the bulls when they got them. So far as the State farms are concerned, we have in some cases stationed dairy bulls at them which were available for the use of settlers in the neighbourhood. Only the other day I transferred from Westbrook to Gindie a pure-bred Ayrshire bull for the simple reason that he was practically doing nothing at the former place. I can assure the gentlemen, however, who have called attention to the position of the dairymen, that I am fully aware that it is one that requires every sympathy. I am very much pleased indeed to receive the assurances of your satisfaction in connection with the business which the Department has endeavoured to carry out; and I am sure that Mr. McLean, and Mr. Lamb, and Mr. McDermott, and others who have assisted in carrying this out to a satisfactory conclusion will be equally gratified at having your approval.

Mr. P. McLean (Agricultural Adviser): Some years ago the Department sent two expeditions to New Guinea, and a very large number of the varieties of cane now being grown in Queensland show the results of those expeditions; also a very large quantity of the cane now grown in New South Wales is, I understand, the result of those undertakings. I made an arrangement at that time with Mr. Knox, of the Colonial Sugar Refining Company, to share in the expense of the expedition and to take a proportion of the cane. The result was that New South Wales got an equal share of what we got. We have also grown in the nursery at Mackay a seedling cane, called the *Kewensis*, which we got from the Kew Gardens, which turned out to be a cane of high commercial value. With respect to stud bulls, I must say that the experience of the Department in this matter has not been particularly gratifying. We stationed a stud bull at the State Farm, Westbrook, advertised him, made the fee as low as possible, and yet during two years I do not believe there were more than half-a-dozen applications for his services. We also sent a Jersey bull to Biggenden, and the results have hardly been more satisfactory. I know that the drought may have stopped the services of the Biggenden bull from being more freely availed of, but there was no such excuse for the Westbrook beast, who was one of the finest animals of his type ever imported into Queensland. With respect to the seed wheat, I may mention that the whole 50,000 bushels we obtained were purchased before any of the South Australian holders were aware that Queensland was in the market.

Mr. G. Turner (Bowen): My colleague and myself have been asked to make a purchase of pineapple suckers, to be taken back to Bowen. Since we have been among the pineapple fields here, I find that there is some disease among them. I am a little suspicious that if we get plants by contract we may get diseased ones, and I therefore think it would be a good thing if an officer of the Department supervised the purchase, so as to prevent a new disease being carried into our district. We are prepared to pay all the expense, and only ask that some competent officer shall inspect the plants and, to the best of his ability, reject any that might be likely to carry disease.

The Chairman: I have much pleasure in immediately complying with your request. I think it is very necessary for anyone who gets suckers from Brisbane to ask the Department to inspect them for him.

Mr. W. D. Lamb (Yangan): It gives me great pleasure to know that our efforts have been successful in getting seed wheat, and I know that I went in the interests of the farmers as well as in my own interests. I am very much interested in wheat-growing in Queensland, and I may say that if the purchase of this wheat had not been successful, and if we had got a lot of rubbish similar to what some of the other States got, then instead of being a whitish kind of a lamb I should have considered myself a very black sheep. We had the wheat practically bought before the South Australian people knew anything about it, and got it without disturbing the market at all. After we purchased our grain, wheat went up 1d. a bushel, and if it had not been for the action of private individuals coming into the market all the wheat we purchased would have been used for seed. The whole of the wheat-growers to a man are glad that the Department listened to their suggestion to have one of themselves go with the officer of the Department to buy the wheat, as it gave them more confidence. If it had not been for the action of the Department in buying the seed wheat, there would have been hundreds of acres this year lying fallow instead of being covered, as they now are, with green wheat. When we were in South Australia, they were going round with the hat getting money for the seed wheat fund, which the Government subsidised in the way we do with our hospitals, and the money was given to the farmers to buy their own seed. The same thing was done in Victoria. There they gave the farmers cash to buy the wheat themselves. I think we adopted a better method of dealing with the whole question than any of the other States. In conclusion, I would like to testify to the energy displayed by Mr. McLean in the selection and purchase of the wheat in South Australia. While over there, about half-past 5 every morning, I used to hear a voice—"Lamb, it is time we were moving"; and move we did from then on right up till 7 and 8 at night; for every bit of wheat we bought, or had offered to us, we had to inspect in both sample and bulk.

FIFTH SESSION.

WEDNESDAY, 8TH JULY, 1903, 9·30 A.M.

The first paper on the programme was that of the Hon. A. J. THYNNE'S, which was as follows:—

QUEENSLAND COUNTRY ROADS.

[By the Hon. A. J. THYNNE, M.L.C.]

Visitors to our State are frequently uncomplimentary in their references to our roads and roadmaking. Town residents visiting our farming districts often speak of them in the same strain; if they don't speak it, they think it. And what about the farmer who has to use the bad road for hauling his produce to market? It is little wonder if he now and then uses language of lurid character. But swearing at a bad road does not mend it, and we should set about practical remedies for a serious evil.

A bad road between a farmer and his market is a great hindrance to profitable farming, and is also an impediment to the social improvement of a farming district.

A bad road is an expensive one; it costs more to the farmer than a good one. It obliges him to keep more draught horses or draught animals than upon a good road. It takes more of his time to do his hauling; it causes more wear and tear of his wagons and harness as well as of his draught animals, and especially in the earlier struggles of a settler's life, when horses, wagons, and other plant are scarce and hard to get, the bad road often deprives the farmer of the fruit of his hard work and self-denial.

Unfortunately, we have plenty of bad roads amongst us, and it would be hard to estimate the annual loss to the people of this State and to their industries by the bad roads.

A bad road is worse than an income tax. A bad road is worse than either a drought or a flood; the drought or flood disappears after a time; but the bad road, robbing the farmers' pockets and preventing them and their family from enjoying the social life which is their right, is always there.

The bad road question has been of years receiving great attention in the United States, as the following extract from their "Year Book of Agriculture" for 1897 will show:—"As to losses by bad roads the office has learned, by consultation with many thousands of the most intelligent farmers of the country, that the expense of moving farm products and supplies averages, on all our country roads, 25 cents per ton per per mile; whereas in the good road districts of this and other countries the cost is only about one-third of this amount. This extra expense amounts, in the aggregate to more than the entire expenditures of the National Government, and, taking into account all of the hauling done on the public roads, the loss is equal to one-fourth of the home value of all the farm products of the United States. The increase in cost of hauling actually done is by no means the only loss resulting from bad roads. The loss of perishable products for want of access to market, the failure to reach market when prices are good, and the failure to cultivate products which would be marketable if markets were always accessible, add many millions to the actual tax of bad roads. Moreover, the enforced idleness of millions of men and draught animals during large portions of the year is an item not always taken into account in estimating the cost of work actually done. The tax of bad roads will become constantly harder to bear as the people of the United States are brought into keener competition with the cheap productions of other countries. . . . The agriculture of this country will not long stand a needless task equal to one-fourth of the value of its products."

A bad road is the opposite of a good road, and the elements which make a good road are:—

1st. A fairly level route, free from steep inclines, bad creek crossings, or swampy, boggy places, or other bad spots.

2nd. A track well drained, and formed up with the sound materials.

The first element, that of the route, is one generally beyond the power of the individual farmer to control. The Government surveyor is the officer responsible when he is surveying the selections on Crown lands. So far as is known, he has general instructions to follow existing tracks as far as possible in surveying for new roads. Where there are no dray tracks in evidence, he has generally to go by one of the points of the compass. The mischief of bad surveying of roads has been done in the districts now settled, but the sooner some steps are taken towards preventing the recurrence of the mischief in new districts the better. It is submitted that when a Government road is being surveyed special attention should be paid to the grade of the road, and that no grade on any road should be steeper than 1 foot in 20 feet. On that grade a horse can only draw 40 per cent. of the load which he can draw on the level. A maximum grade of 1 foot in 24 feet would be better, if attainable, because on that grade a horse will draw one-half of a load for a level road. I would ask the Conference to concur in a request to the Government to give such instructions to their surveyors as will provide for future settlers in this State the first element for the making of a good road—namely, a fairly level grade avoiding swamps, bogs, and bad creek crossings.

The matter of providing a similar advantage to the already settled districts is not so easily dealt with. But it is not impossible. There is a roads branch of the Lands Department whose officers are always ready and willing to promote the adoption of improved roads. They are creditably keen in their work, and I believe fully realise the disadvantages of bad roads to the community. There is, unfortunately, only too wide a field for their energies. But, besides the Lands Department, the shire councils have to be consulted on such road matters, and here is the point at which the farmers in any district can bring their influences to bear in the many ways which need not be detailed.

Greater difficulties will probably be found with the shire councils than with the Lands Department in bringing about the much-needed roads reform.

Outside of the cities and the more populous towns and shires the present revenues are too small to allow of the employment of a competent road engineer for each shire. Usually the only skill available is that of an overseer or ganger. Some of these men are undoubtedly capable of doing good work, but, as a rule, there is need of men of wider experience and better training. This need will become more pressing as time goes on and settlement becomes closer, and so will the impediments in the way of laying out better routes for the roads.

The only way that suggests itself is that of the combination of a number of shire councils in one district to secure the services of a competent man to advise the councils on matters of the laying out and construction of roads, the construction of bridges and culverts, and to have a general supervision of such works. Such an engineer would be able, with one or two intelligent men, to make good use of a suitable plant of road-making machinery, such as might include a traction engine, with stone-breaking outfit, distributing carts, road machine, grading plough, and steam roller. A full plant of this description was supplied to the Department of Agriculture in America, in 1897, at a value of between 6,000 dollars (£1,200) and 7,000 dollars (£1,400), and should be capable of importation into this State for less than £2,000. If our shire councils will take this matter into consideration, and vigorously tackle this bad road question, it is quite certain that such a plant in the hands of a competent man would effect an enormous saving of expense, bring about a superior class of roads, and would annually put more than its total cost into the pockets of the farmers.

If we look at the condition of the country roads, whether on the black-soil plains on the Downs or on the broken red-soil scrub country on the coast, or even on the more level forest country in any part of the State, during a rainy season, and take a note of the difficulty and often of the impossibility of getting produce to market, we will see how widespread and extensive is the loss and discouragement to agriculture caused by bad roads. There are good materials for road-making everywhere in abundance. All that is needed is a realisation of the importance of having good roads and the skill to lay them out and make them.

Agriculture may be promoted as much by the removal of impediments to its full development as by positive or direct assistance; and if Parliament is desirous of promoting agriculture, as nearly, if not all, the members profess to be, there is hardly any way by which such a desire can be given better effect to than by promoting better knowledge and better practice of road-making in agricultural districts. If the finances of the State allow of any additional outlay, the addition to the Department of Agriculture of a road inquiry branch, with a capable road officer to advise farmers and shire councils in farming districts, would be one step in advance. The expense would be a small fraction of 1 per per cent. of the annual loss and waste of money that now goes on.

In the Richmond River district, in New South Wales, the roads are constructed on the following lines:—

1. Maximum grade, 1 foot in 18 feet.
2. Width of formation, 18 feet.
3. Width of metalling, 12 feet.
4. Quantity of metal—average 6 inches deep—equal to $\frac{3}{4}$ cubic yard to 1 lineal yard.
5. Average cost of cutting, forming, metalling, hauling, blinding, &c., £480 per mile.
6. Cost of broken metal, 2s. 3d. per cubic yard.
7. Usual rate of hauling metal, 1s. per cubic yard per mile.

These roads are mostly on red and black scrub soil. They are solid and wear well, costing but little in maintenance. The heaviest loads on timber wagons, &c., leave little or no mark on them. To these roads is mainly due the great progress and the wealth and prosperity of the farmers there. They are constructed under the supervision of an engineer for roads.

Some reference has been made in this paper to the location and the grade of good roads. On these matters, as well as on the drainage of roadways, the surface formation, whether of earth, timber, gravel, or stone, the general principles to be observed in the construction of roads, their maintenance, and also on the many advantages of using broad tires on wheels, a great deal more might be said which could not be well included without making the paper unreasonably long. Attached, however, is a table of gradients between 1 foot in 10, and 1 foot in 30, which may be of interest as showing how much the hauling power of a horse is affected by the grade of a road, as compared with his hauling power on a level road of the same quality which is taken as represented by the unit 1.

TABLE OF GRADIENTS.

Inclination.	Angle.	Rise in Feet per Mile.	A Horse can Draw.
1 in 10	5·43	528	0·25
1 in 11	5·11	480	0·265
1 in 12	4·46	440	0·28
1 in 13	4·24	406	0·295
1 in 14	4·5	337	0·31
1 in 15	3·49	352	0·325
1 in 16	3·35	330	0·34
1 in 17	3·22	310	0·355
1 in 18	3·11	293	0·37
1 in 19	3·0	277	0·385
1 in 20	2·52	264	0·4
1 in 24	2·23	220	0·5
1 in 25	2·18	211	0·52
1 in 26	2·15	203	0·54
1 in 30	1·55	176	0·64

We may complain of bad management of markets, of low prices, of over-competition, of dear money, of excessive expenses, and of the many other things that are spoken of, but if all these evils were combined into one they would hardly equal the losses sustained yearly and every day in the year by our farming community, and hence this presentation of the subject to this representative Conference, and this earnest appeal to its members to press the matter on the attention of their societies, their neighbours, their shire councils, and, if need be, their representatives in Parliament.

DISCUSSION.

Mr. W. G. WINNETT (Beenleigh) pointed out the difficulty in maintaining roads in freshly opened up districts. In many cases there was no foundation for the roads, and it was quite evident that the settlers in the repurchased estates would not be able to get good roads without having to submit to very heavy taxation. A rate of 3d. in the £1 would not half pay the cost of building and maintaining roads in a new district, but that was all that could at present be levied.

Mr. C. P. MAU (Mackay): I should be neglecting my duty if I did not say a few words on the subject of the maintenance of good roads, for we all know what it means to have bad roads. In our district we have gone in for the road-making machine, and, as a member of the local shire council, I know what the value of that machine is. I know, too, the value of good roads. I have been here for twenty-one years, and know what the roads used to be; and I know the amount of money that has been spent on our roads and for which no practical benefit was received in return. In Mackay we have been using the Champion road-making machine—the shire council having two of them, and the municipal council one. We can now attend to our roads for about half the cost of what we used to spend on them, and, moreover, the roads are twice as good as they were. We intended putting a heavy roller over them, but we had to study economy, for we thought we were sufficiently taxed, and that was one of the main reasons why we looked about to see if we could not maintain our highways at a less cost than we had been paying. As the result of our experience I can safely say that if you can secure a road-making machine, and combine a roller with it, you will be able to make and maintain really good roads at a greatly reduced outlay. We have also taken into consideration the question of broad tires, and it is to be admitted that if you could induce the farmers to use broad tires our roads would last much longer than they do. I certainly think Mr. Thynne is to be thanked for his paper, and if the delegates here will push the question further when they get back to their respective districts, an appreciable improvement in our roads will be noticeable within a very few years.

Mr. H. A. TARDENT (Toowoomba): Like Mr. Mau, I think we ought to be very thankful to Mr. Thynne for bringing forward this subject. In my opinion it is the most valuable paper that we have yet had before the Conference, and if it is acted upon it will do an immense amount of good. I must say that his idea that the local authorities should have scientific skill placed at their disposal by the Central Government is an excellent one. Every shire is not in a position to be able to pay for professional knowledge, but that it is wanted all over Queensland in connection with the maintenance of roads and bridges is apparent to anyone who has ever directed the slightest attention to the subject of local government. The adoption of Mr. Thynne's suggestion in this connection would assuredly greatly tend to the improvement of the roads of the State.

Mr. A. WAGNER (Nundah): I think it would be a good thing for the shire councils throughout the State if they adopted the use of machinery in the manufacture of roads, and no doubt a similar result, similar to that at Mackay, will take place if it is tried in other districts, especially on the Downs, where they have long stretches of country without any stumps. I was, in a way, connected with the purchase of the first road-making machine that ever came to Queensland, and, although it was not so well adapted to our district as it is to country ones, we found that by its use we effected a great saving in the upkeep of our roads. Among the boards that wrote to us for information concerning the machine was the Pioneer Board of Mackay, and I am glad to find that it has been so successful in that district that they now have three machines there. The importance of good roads to the agriculturist cannot be overestimated; and I know that Messrs. Gibson Bros., of Bingera, are of opinion that while they were at Doughboy Creek they lost thousands of pounds directly through the agency of bad roads.

Mr. F. M. Murtagh (Nambour): The settlers of the country are under a debt of gratitude to Mr. Thynne for the valuable information contained in his paper. It is not my intention to say much on the matter, although I could say volumes on the subject of bad roads, and I know of one of the finest districts in Queensland that is practically lying dormant for the want of a good road to it. It is impossible to say what crops could have been sent to Brisbane from that district if it had only been approached by a decent road, for it is only during the past few years that there has been access to that particular district. A great fault with divisional boards is, that they use too much soil and not enough stone. If they were to try, instead of patching up 5 or 6 miles of country with a barrowful of muck, to construct 10 or 15 chains of permanent highway every year, then, in the course of time, they would have far better roads, I think, than they get by their present system.

Mr. W. J. Burnett (Harrisville): I think the paper read by Mr. Thynne should be brought under the notice of all the shire councils of the State; but there is one thing I would like to refer to, and that is the question of road metal. Now, in good land, you will generally find it a fact that metal is not easily procurable, and in places where the country consists of plains and black soil ridges metal is a very serious item in the finances of shire councils. We have repeatedly requested the Railway Department to carry metal at reduced rates; and if all the local governing bodies combined to get the railway authorities to reduce the freight on metal, one step at least would have been made in cheapening the cost of road-making in country districts.

Mr. G. Martin, M.L.A. (Childers): The paper read by Mr. Thynne opens up a very large and important question, and he deserves our warmest thanks for reading it. I would like to say, however, that the figures he gives concerning the cost of road-making on the Richmond River are rather misleading. There, first-class roads have a grant of £50 a mile per annum, and they are constructed under a road engineer. In Queensland, on the other hand, we have to put our hands in our pockets for the construction of our highways. In the mother colony there is an annual vote, first-class roads getting £50 per mile; second-class, £25; third-class, £15; fourth-class, £10; and fifth-class, £5 per mile; and culverts are treated in a similar way. Besides this annual vote, special grants are frequently made. I was an alderman in a town in New South Wales for six years, including one year as mayor, and I have also been a foreman of works, so I know something of the maintenance of the roads in that State. The maximum grade mentioned in Mr. Thynne's paper is fairly correct, the width of formation is correct, and the width of the metalling is all right. The prices paid for metal, however, are not correct. The metalling costs from 6s. to 8s. a square yard as against the 2s. 3d. mentioned in Mr. Thynne's paper. It must be remembered that the Richmond River district is admirably adapted for road-making. No matter where you go there is splendid blue stone, but you have to pay 1s. a yard to the farmer on whose land it is. A road contractor can go on to a man's private property for metal, but, as I have just stated, he has to pay for it. Mr. Thynne puts the average cost of road-making on the Richmond River at £480 a mile, but I know plenty of the roads there cost £1,000 a mile, and on the whole I must say that we get more value for the money we spend in Queensland on our roads than they do in New South Wales.

Mr. F. W. Peek (Chamber of Agriculture) also contributed to the discussion, and advocated the providing of more reserves to aid the shire councils in procuring cheaper supplies of metal. On the question of road-making machinery, there could be no argument, for those who had seen a machine knew that it will do as much in a day as six men in a week, especially on the Downs roads, where the plough goes along and throws up the land almost automatically.

Mr. H. E. WYMAN (Ipswich): In dealing with Mr. Thynne's paper I shall pass right on to where he recommends in the surveying of roads the exercise of more care. This is one of the main points in road-making, and it cannot be denied that in the past too much attention has been paid in the mapping out of roads to the saving of distance. How often have all of us noticed when passing a boghole in a road that it could have been avoided if the road had been diverted a few yards on either side? In road-making there are some soils that really only want formation to give them a surface suitable for ordinary traffic. There are others on which the 6 inches of metal spoken of by Mr. Thynne would be lost after the first rain and the first traffic after it. Some times after roads are made they are cut up purposely by some people. I remember once passing over 5 or 6 chains of freshly metalled road which a few weeks after apparently returned to its original condition. It is recommended that shire councils should combine to look after roads. The cost of making a road, according to Mr. Thynne's estimate, and I think it is on the low side, is such that one mile of road would absorb the revenue of many shires for a twelve months. We know that the Home Secretary has often to compel boards to combine for a general purpose, and I think that, in the cutting up of selections for farming, the Government should make the roads through the land and then add to the price of the land the cost of the roads through it. It would not cost more than a few shillings per acre; and if the repurchased estates were cut up with good roads going through them, then the value of the land would be considerably enhanced. The selector would pay the slightly increased purchasing price much more cheerfully than he would the high rates that otherwise would inevitably follow. We know that in several districts it is very difficult for farmers to get their produce to market, and anything that can be suggested to lessen that difficulty deserves our fullest consideration. I hope the paper and the discussion on it will lead to something that will tend to improve our country roads. The grades suggested in the paper are very good, for we know the steeper the road the more difficult it is to keep in repair, but the width of road as suggested is probably hardly enough, as it would barely give room for a couple of vehicles to pass each other.

Mr. DEACON (Allora): I think Mr. Wyman's idea of the Government making the roads through the repurchased estates before they are opened to selection is worthy of special consideration One gentleman complained that farmers are not sufficiently represented on the shire councils, but I have never noticed any difficulty in putting in men who represent the majority of the people. We find the large estates a very great advantage as far as local government is concerned. They get no roads themselves, but they pay rates, and we spend those rates on roads. Shire councils do not deserve all the blame that is thrown on them for bad roads. The trouble is they have to make roads in one generation for all time, and they are not able to do it. Reference has been made to the good roads in New South Wales. But they had a good start there, for they had a sort of labour which was very cheap, if not very efficient. There was one strong point which Mr. Thynne touched upon, and that was the question of the surveying of roads. They are now laid out much better than they were. I do not think we can at present find much fault with the roads branch of the Lands Department. There are two things in Queensland closely connected with the question of road-making, and one is the matter of broad tires. A shire council very often spends a couple of hundred pounds on a road, and then a bullock team comes along and spoils the whole work. Any scheme, therefore, for the radical change of our road system will have to take into consideration the matter of tires. The other matter is the question of engineering skill. The direction of the construction and maintenance of thousands of miles of our roads is often entrusted to men who know nothing about them, and if any system could be devised by which shire councils could be advised, and be furnished with proper plans, it would mean that our roads would, as a whole, be vastly improved, and that a lot of money that is now wasted, through ignorance, would be saved. We build bridges, and put twice as much timber into them as is really required, with the result that they often fall in from their own weight. It is advice that we, as road-makers and bridge-builders, want.

Mr. E. Adams (Rockhampton): I notice that Mr. Thynne advocates the purchase of expensive machinery for the making of roads, but I think we should see where we are before we adopt that suggestion. Some years ago, in the Rockhampton district, we bought a traction engine with the idea that it would save us a lot in the matter of haulage. But it did not pan out in practice, for the simple reason that our roads would not stand the traction engine hauling loads of metal over them. One advantage of the usual method of road-making is that it provides employment for the farmers in a district during slack times, and, in this connection, I may say that our council always makes it a point of making its road contracts when farm work is slack. When the divisional boards first started, and a kind Government gave us the control of our roads, we got £2 for every £1 we collected in rates. But now that is practically abolished, and we get all the work and all the blame. I would like to see the shire councils confine their attention to the roads, for at present they have too much to attend to. The shire councils have to keep roads open not only for the farmers, but for the whole country, and therefore I think the whole country should contribute a little towards the expense.

Mr. J. Mann (Cairns) stated that they had tried the road-making machine at Cairns with successful results. It was not very expensive, and can be used in any place where a plough can. The municipal council up there had also invested in a traction engine, but it had not been such a success.

Mr. C. Dallon (Rockhampton): In the Gogango division some years ago a regulation was passed and adopted by the Governor in Council to enforce the broad tire. It was always, however, inoperative. I quite agree that the adoption generally of a broad tire would mean a marked improvement in our country roads, but it has to be borne in mind that the strict enforcement of such a provision would mean a big expenditure to numbers of farmers. To put broad tires on an ordinary dray you have to take off your wheels and put in new felloes and axles. I think, however, that it would be a good idea were everyone purchasing a new dray to insist on broad tires. Irrespective of its effect on the roads, the narrow tire is much harder to pull than the broad, and for that reason alone farmers should adopt the latter whenever practicable. Still, I think that, before making the broad tire compulsory, they should give the matter full consideration.

Mr. Atkinson (Danderoo): The question of road-making and good roads is a very big one, and the difficulty our shire councils have to encounter is the fact that they have so many roads to attend to. Our shire council is in a pretty wealthy district, and has been very sympathetic to the farmer. This year it has reduced the rates, but I think it would have done more good if it had increased them. As for road-making generally, there is no doubt that a lot of money is wasted for want of a little more. Farmers would help themselves if they adopted the broad tire. I am by trade a wheelwright and coachbuilder, and can say that the general introduction of broad tires will do as much as anything to solve the bad road difficulty. The broad tire is the very best that you can put on to farm lands, and when I started farming the first thing I did was to build a dray with 4-inch tires. I wanted 5-inch, but there was a difficulty in getting them. It is the lightest dray in my part of the district, yet I can guarantee to take on it a bigger load to the railway with one horse than any other man on the country side. The local authorities could do much to encourage the use of broad tires. If there were a tax put on all new 3-inch tires, we would soon get wider ones. When the wheelwright firm I was in first went to Hughenden, we found the 3-inch tire was the standard, and we said to the wool men, "Go in for wider tires." When we left there, we had instituted the 6-inch tire—the greatest road-maker ever introduced into the black-soil plains.

Mr. McLEAN (Agricultural Adviser): I think this Conference has risen to the high-water mark in having presented to it papers of an intensely practical nature. I move that Mr. Thynne's paper be submitted to the Resolutions Committee.

The motion was seconded and carried.

The Hon. A. J. THYNNE: There are one or two points, brought out by the gentlemen who have spoken, upon which it would be as well if I said a few words. The last one is the question of broad tires. As affecting roads, the broad tire question is an important one, indeed; and I can tell you that Mr. Atkinson's experience as to the benefit of the broad tire is borne out in other places where it has been used. My son tried the experiment of 6-inch tires on the Downs. I wanted to try the experiment, and sent to America for the wheels, getting them at a cost of under £1. My son afterwards left the Downs, but the gentleman who bought his place would not now part with those wheels for any price. With a wagon or dray with broad tires you can carry heavy loads, you can go into your lucerne field without cutting it up, you do not cut up the track through your slip-rails, you do a minimum amount of injury to the roads, you are less severe on your horses, and you have the consolation of knowing that you are doing no harm to your neighbours. Mr. Burnett, of Harrisville, spoke of the scarcity of metal in certain districts. There is no doubt that there are spots to which metal has to be carried some distance. A couple of gentlemen have stated that in their districts the use of traction engines in road-making was not accompanied by any great degree of success, but before we attach importance to the experience of the use of machinery in these instances we should be furnished with further particulars, for so much depends upon how the machinery was worked, how it started, how it was controlled, and whether the people in charge of it were merely experimenting or whether they were giving it a practical trial.

Mr. G. N. TERRY (Stanwell): The whole secret is, the machinery was there before its time. The interest on the outlay was so great that it more than covered the advantages.

The Hon. A. J. THYNNE: That is why I suggested shire councils should combine to get a plant. Machinery of that kind is not remunerative unless it is constantly employed. Mr. Wyman touched upon the case of a road being nicely formed, and then the metal disappearing. That is a matter that comes within the subject of the drainage of roads. If a bit of a road is properly made, there will not be much chance of metal being lost. I did not contemplate in my paper the question of joint boards. Joint boards are necessary as a sort of whip for quarrelsome councils, and I do not think that farmers' councils are quarrelsome. I think they are sensible enough to work quietly and comfortably together without being put into double harness by the Government. Mr. Martin questioned some of the figures I have given of road-making on the Richmond River, but I do not think has questioned the information I have given. The information I got was obtained in January last in Lismore through the kindness of the member for the locality, who obtained it first of all personally, and also from the Roads Department of New South Wales. The information was officially given to me on the subject. When there I was greatly impressed by the great part the roads play in the prosperity of that district, and it is a district that I suppose has made bigger progress than any other part of Australia within recent years. It is a district that is no better in its capacity for dairying purposes than plenty of the country in Queensland, yet £500,000 a year is distributed there among the farmers for cream alone, and I think we should be up and seeing whether similar work cannot be done in our own State. Mr. Martin stated that he knew some parts of the Richmond River district in which the roads had cost £1,000 a mile. Of course, I quoted the average cost. We all know that in making roads you have bad spots which will cost three or four times more than others. In some places you have bits of country over which road-making is very expensive, but on an average the roads there cost under £500 per mile—that is, according to the figures given to me, and which I believe are correct. There is no local government in New South Wales, so I hardly understand where the grant comes in. The whole of the work is done by the Engineer of Roads, and the grant is expended by the Sydney Government. It comes out of the pockets of the taxpayers, and the Government has the patronage of it, instead of the local authorities as here. It is a curious thing in this country, where we need our engineers, where we need our own young men being brought up to that trade, that we do not bring any of them up to it. Our engineers are all railway engineers. The highest ambition of any of them is to become a railway engineer under the Government. Is it not about time the divisional boards gave encouragement to our own young men to learn engineering in our own institutions in Australia, and to develop that skill which is necessary for the growth and expansion of the country, as it has been proved to be in America?

Mr. James McCartney, of the Forest Hill Agricultural and Progress Association, then read the following paper on—

ROAD-MAKING AND DRAINAGE.

[By Jas. McCartney, Forest Hill.]

In dealing with this question, the writer confines himself principally to agricultural districts, particularly to where repurchased estates are being cut up for selection, and to plains where black-soil flats exist.

First: The Necessity for Good Roads and How to Accomplish Them.

In low-lying country or black-soil flats great care should be taken to have all main or leading roads surveyed through the highest places, and particularly near to points where road-making material, such as gravel and stone, can be obtained. When the material is not convenient there is the greater necessity for having the roads on the higher parts, as then drainage is more easily accomplished. Insufficient consideration to the points mentioned means heavy expenditure on the part of the shire councils and considerable annoyance to the settlers. In the past form of survey it was the custom to have the main or leading road surveyed at a distance of from 50 to 100 chains from the river or creek banks. This applies in particular to West Moreton. In the rich valleys of this district the cultivation, in many instances, does not extend beyond a distance of 200 chains to the ridges, so that, as there is mostly a fall or elevation of the surface, the road often strikes through a great portion of the low-lying parts, where a great many swamps and watercourses are often to be met with. The practised method of making roads in such places by shire councils is by a heavy formation, which only tends to make the road more difficult for traffic in wet weather, as the water diverts into the watertables, and there stagnates, and only helps to keep the road in a more boggy condition when there is no way for drainage.

At this stage I wish to point out the necessity that is required in the survey, when the mapping out and lithographing of the land are being done, of having provision made for open drains to be constructed where swamps and watercourses conjoin—the drains to be opened and controlled by the shire councils. In this way great assistance would be given to local governing bodies, and many grievances on this and other matters, where legal advice has to be got and much expense incurred, would be removed.

I wish to make a few remarks here as regards the district I represent in particular, and for an example I take lucerne-growing. In former years, when farmers began to grow lucerne, it was only on a creek bank or on some fancy piece of the farm that it was sown; but as time advanced and the seasons became drier they turned their attention to the low-lying parts, and with the aid of drainage and deep cultivation the lucerne has been found to grow luxuriantly, and in many instances the surface water finds its way on to the roads, and there causes great washaways for want of a proper outlet.

Second: The Urgent Need of Assistance towards Repurchased Estates.

In considering these estates in particular, it should be noted that a great many extra roads are required to give access to the portions or farms. This involves a great amount of expenditure, and requires immediate attention to assist the people who are settling on the land. From personal experience in the past, I know that matters in respect of roads have been very unsatisfactory, as the local governing bodies have not derived sufficient revenue in rates to warrant the expenditure required, and, as the settlers on this land have a considerable amount of extra traffic in getting building material to their farms, a great deal of extra labour and expense are caused. In the transit of produce to markets, good roads are as much required as is a railway. Farmers are compelled to take advantage of a time when the roads are in good order and a rush of produce sets in. The result is that our markets become glutted, the prices drop, and are very irregular and unsatisfactory, whereas if good roads were maintained our markets could get a regular supply and our railways better adjustment in carrying, as often blocks occur for want of trucks. There are a great many disadvantages that could be remedied if a better system of road-making and drainage were accomplished.

Third: The Need of Legislation to Give Local Authorities More Power.

In concluding, I wish to point to the urgent need of legislation giving the local governing bodies more power to raise revenue. Now that it has been hinted by the Premier in a recent speech that they are not likely to receive any assistance next year from the Government, it is claimed that the valuation at present under the Act is not sufficient to produce the revenue that is required to maintain the streets and roads. This applies more particularly to town property, and also to agricultural districts where more constant and heavy traffic occurs. In many cases the present valuation does not amount to half the selling value of the properties. It is also claimed that town and shire councils' boundaries are too limited, and that too much revenue is swallowed up in building and maintaining offices and paying clerks and overseers. This is particularly the case as regards shire councils in country districts. Borrowing also is too much practised and too extensive with local governing bodies, and, therefore, with increased revenue from extra taxation and by lessening office expenditure, they would be made more self-supporting.

I would like, before concluding, to suggest on behalf of local authorities that in places where road-making material is difficult to obtain through long distances arrangements might be made with the Railway Department to have metal or gravel carried along and deposited at some convenient place. In many instances this could be done with great advantage to local bodies and their contractors.

I would also like to suggest that, after the Government valuations have been fixed on the various portions of repurchased estates, an additional sum—say 1s. per acre—be put upon the purchasing price. The money raised by this means could be given to the shire councils most interested, to be used by forming and maintaining roads in the repurchased area, and in the building of necessary bridges and culverts.

DISCUSSION.

Mr. A. Wagner (Nundah): The question of putting an extra price on the land with the view of spending more money on the roads can be got over by people assenting to have a separate rate over the area they are interested in. The Local Authorities Act provides that, and, as for putting an extra price on the land, that may militate against the success of the selection of the land; you have to see first whether the price to be asked for the land is a price that will be obtained for it, and if more money is required afterwards for roads it can be done by the local authority levying a separate rate.

Mr. G. Turner, of Bowen, considered that shire councils should have power to levy higher rates than at present rather than power to increase the valuation of the lands; and Mr. W. Fielding, of Redland Bay, pointed out that legislation was necessary to permit of people living in flat country constructing drains to carry the water, in rainy weather, off their land.

Mr. W. Berlin, of Rosewood, considered the shire councils had quite enough power in the matter of levying rates, and thought it was for every man to drain his own land and generally look after his own property; while Mr. A. Hunter, of Laidley, pointed out that what was wanted was a Drainage Act, so that if a drain cut through a property other farms could drain into it

Mr. F. W. Peek (Chamber of Agriculture) believed that the Hon. E. J. Stevens had introduced a measure of this nature into the House, which had become law, but whether it had ever come into operation Mr. Peek did not know. The Act was passed at the instigation of the Pimpama Island farmers, who wanted power to drain their lands.

The Hon. A. J. Thynne, M.L.C.: It is a fact that the Hon. E. J. Stevens introduced a Bill to provide for drainage in agricultural districts, and I had the privilege of taking charge of that measure in the Council. It became law, and it is now embodied in the Local Authorities Act at the present time. What I have risen to say is, that the great difficulties in connection with this matter are, first, to keep water when we want to keep it, and, second, to get rid of it when we want to get rid of it. I was sorry I was not here when the subject of riparian rights was discussed. In this country we ought to see whether we could not do away with some of the ordinary laws that we have brought from the wet countries from which we have originally come. In European countries, where there is an ample fall of rain, the law is that you cannot interfere with the course of a river. In this country it ought to be recognised that it was the duty of everybody to catch and hold as much water as they possibly can. We have adopted from our forefathers the laws and principles that were applicable in a moist climate. We have got to manufacture principles applicable to a dry country. Apparently the knowledge that the Local Authorities Act provides for the carrying out of drainage schemes in agricultural districts is not generally known, but there is provision for such schemes. Whether it is practicable or not I do not know, but it was an honest attempt on the part of Mr. Stevens to meet a practical difficulty. I understand the farmers of Pimpama Island did take advantage of it.

Mr. W. Ewart (Nundah) complimented Mr. McCartney on his paper, and described what he had seen of the difficulties of drainage in the Lockyer district.

Mr. J. McCartney (Forest Hill): I might say that I do not claim to know all the provisions of the new Local Authorities Act, but the great difficulty with us is the getting rid of the surface water. It is the land that needs drainage, and I may state that about five years ago I bought a piece of land, for which I was called a fool. I ploughed right round the fences, and the surface water goes off to some extent, but there is no outlet, and when there is a great rush of water it stops too long and injures the lucerne roots. The Act does apply to the question of drains through private property, and I believe it is going to be shortly tested. As I said before, the great trouble is the surface water, and with open drains provided for, in the first instance, it would be largely got over. Of course deep drains would have to be made. The land I am referring to would be very valuable when it is drained.

The Hon. A. J. Thynne: Is there gravel after you sink down a bit?

Mr. McCartney: In most of the wells sunk there we find 7 to 8 feet of black soil, then chocolate soil mixed with sand and loam. At 20 feet sinking we come on the gravel bed—a gravel and sand bed for about 3 feet. That is probably the bed of a creek. It is thought in our district that, if what I have advocated in my paper were done in the survey of the new repurchased estates, it would considerably enhance the value of those properties.

The next paper was on—

IMPROVEMENT OF BREED OF HORSES.

[By C. Dallon, of the Rockhampton Agricultural Society.]

The subject which I intend bringing under your notice is to devise some means by which we can improve the breed of horses in the State. We have such a large number of horses of inferior quality that they are almost useless and of no market value. You must have noticed in the papers that the Premier received a letter from the authorities in South Africa notifying him that Queensland horses had been condemned for service there owing to their viciousness and inferior quality. This will mean a serious loss to the State, as the South African Government will require a large number of horses for army purposes. You must also have noticed in the local newspapers that the Indian Government find fault with the Australian horses not being up to the standard of previous years, and they appointed a commission to inquire into the matter, and if possible to suggest a remedy. The commission made three suggestion—

First—A tax on stallions.

Second—Preventing the exportation of young mares, and to keep them in the State for breeding purposes.

Third—For the Government to provide stallions.

This communication was sent to the Commonwealth Parliament as a suggestion to improve the breed. Later on, a conference of horsebreeders was held in Sydney to give this matter consideration, and Major-General Hutton, speaking on the subject, remarked that there was no country which had better facilities for breeding horses than Australia, owing to the extensive areas and mildness of the climate. He also mentioned that Australia should not only supply South Africa and India, but England. He mentioned an enormous number of horses that were imported into England annually from America, Germany, Holland, and France, but none from Australia. He also described the class of sires suitable to get horses for the English army and for private use. In London alone, he said, 1,000,000 horses were used annually for cabs and omnibuses The class of stallions that he suggested for getting horses for that purpose was a thoroughbred horse, standing 15·1, with good head and neck, sloping shoulder, short back, good loin and quarters, with good legs. He also recommended a light active draught, and that is the class of stallion that will produce stock suitable for the English market.

I am in favour of putting a tax on stallions not to exceed £10, and £5 might be sufficient; this tax to go to improve the breed of horses in the way of offering prizes for first-class stallions. The State would have to be divided into districts, and every district would have its own revenue. The agricultural societies or shire councils would be able to collect the taxes, and offer prizes and fix the fee for the service of stallions to be held at shows, if of sufficient merit. Every class of stallion would have its own revenue. There is no one who would derive more benefit from this than the farmer or small holder, as they would be able to get the services of first-class horses at a nominal price, which will be better for them than if they had a medium horse for nothing, because what they get from good sires will be fit for export. It is the large horsebreeders who will produce the revenue, because owning their own stallions they derive no direct benefit, but must benefit by the doing away with inferior classes of horses, and thus obtain a market for horses with slight blemishes.

STATE STALLIONS.

I am of opinion that the Queensland Government could supply stallions without any loss to the revenue and with great benefit to the State. I would suggest stud farms in different centres of the State, consisting of areas of about 6,000 or 8,000 acres somewhere close to the railway line where Crown land is available. I would propose £2,000 for improvement and £4,000 for eight stallions. Each stallion will serve seventy mares at a fee of £2.

This will make the outlay £6,000.

Income from service of horses		£1,120
Working expenses	£700	
Interest on £6,000 at 4 per cent.	240	
		940
Balance		£180

These are some of the means which I suggest for the improvement of the breed of horses in the State, and I now leave the matter for the Conference to discuss.

DISCUSSION.

Mr. S. L. JONES, of Roma, was in favour of Mr. J. T. Bell's proposed tax on entires, but he also advocated the establishment by the Government of stud farms, which he thought could be made self-suppporting.

Mr. W. DEACON (Allora): Mr. Dallon's is a good paper, but I may say that I am an opponent of the proposed tax on stallions. There is a lot said about the necessity for improving the breed of horses, but I think that something to improve the market would be more to the point, for the market has had a very great deal to do with whatever deterioration there has been in our horses. I say nothing about blood horses and a tax upon them, but shall confine my remarks to draught animals. I keep my own stallion; and when you breed horses which cost you £10 each and only get £5 for them when you sell them, it is a great discouragement. With regard to the general breed of farm horses in Queensland, I may say that in my experience of draught horses those we have at the present moment are far superior to those of thirty and twenty years ago. I see no degeneration in our farm horses anywhere. If you wish to breed horses it is not the stallion or the mare you should look to so much as the feed. Three-fourths of the breed of a horse goes down the throat. As our natural grasses have deteriorated or disappeared, if you want draught horses you must feed the yearling foals and the two-year-olds, and you must feed them well. But what often happens is, that they are turned out to forage for themselves and come back scarecrow-looking things with legs and no bodies. People then complain of the deterioration of our horses. But it is not the breed, but the feed. You want weight in the draught horse. It is said that our horses in South Africa were no good, but my son, who was in South Africa, tells me that they were quite equal to anything else that was imported during the progress of the war. It is proposed to get rid of our bad stallions by taxing them, but a simpler way would be to destroy them first. Have an inspector of stallions; and if an animal is not fit to travel the country, then have him destroyed. How a tax is going to improve the breed of horses I cannot say, because it would lessen competition. At present, as a matter of fact, there are far too few stallions. I have known a stallion to take 200 mares at £3 each. I think this matter should be left to the commercial sense of the community. Why should stallions be taxed any more than any other male animal, say a ram or a bull? Breeders will agree with me that the stallion, after all, is not the principal part in the manufacture of a foal. More depends upon the mare. You must have good mares, and I think there is more fault to be found with the mares of Queensland than with the stallions. Twenty years ago we could buy a mare for £3 or £4, and we could get £10 for the horses we bred from them. Lately you could only get £5 for draught horses, and as for saddle kinds you could not expect more than a couple of pounds each for them. Every horsebreeder knows that, if he has nine or ten mares, it pays him to keep a stallion. If anything further is done in the matter of this stallion tax, I hope it will be referred to the societies for their opinion.

Mr. E. Adams (Rockhampton): It seems to be conceded that the Government are not going to supply us with either horses or bulls If they will not supply us with one, they are not likely to supply us with the other. The question then resolves itself into whether we are to tax stallions or not. For myself I fail to see how a stallion is going to get better stock by having £10 a year tax put on to him. There is no doubt there are many small breeders who keep a stallion for their own purposes. They would just as soon pay the Government the tax as pay for the privilege of sending their mares miles away to another breeder. I would suggest as an alternative that stallions be registered. Horses registered for outside service could be inspected by some competent official. A man who wished to keep a stallion for his own uses could keep any sort of animal, just as he keeps his own bull, billy-goat, or rooster. Unregistered horses, however, should be treated like goats, for there is no doubt that inferior entire horses kept by careless people are often a menace to the to a whole district.

Mr. W. J. Burnett (Harrisville): While thoroughly recognising the necessity for some improvement in our horses, I am not altogether sure that the steps advocated by Mr. Dallon would be in the right direction. In the first place, I think our brood mares require just as much attentiou as our stallions. Again, Mr. Dallon mentioned, in respect to the question of the inspection of stallions, that judges should not be allowed to give prizes to animals that failed to reach a certain standard. Judges, however, have that privilege now; and if, at a show, they do not consider an exhibit worthy of a prize, they do not award one. In the breeding of horses in Queensland to-day, the matter of starvation has to be taken into consideration when inquiring into the causes of our deficiencies. If the foal is not fed, he will never make a horse. An increase in the system of gelding horses would create a monopoly. With fewer stallions in existence, what would there be to prevent the owners of them charging exorbitant fees for their services? We know perfectly well that the breeders of Queensland to-day are just as anxious as anyone to breed a fair class of horse, and I consider that the majority of those of you who are rearing farm horses to-day are fairly competent judges. I take it, therefore, that you are not likely to send your mares to inferior weeds, for it is not to your interest to breed weeds. The weedy horses will cost just as much to keep as a good one, and I think the average breeder of farm horses is sufficiently seized of this fact. I do not think that the putting of a tax on stallions will improve the breed of our horses.

The Hon. A. J. THYNNE: Notwithstanding what Mr. Deacon has said, I do think that in our draught horses there has been great deterioration during the last thirty years. I remember Wienholt's AW1 brand, and splendid animals carried it. Where are horses like those now to be found? Our horses have deteriorated because, instead of keeping up the high types of mare and stallion which the Wienholts kept on their property, people have kept half-breds, passed them off as animals of Wienholt's breeding, and deterioration has been going on. I think you cannot find to-day in Queensland the type of farm horse that we saw here twenty-five or thirty years ago in all parts of Queensland. With respect to the proposition of a stud farm, I appeal to all farmers and to all people who look to the welfare of this country not to allow, if they can help it, the Government to take over enterprises which the farmers themselves can carry out. When I had the honour of being in our Chairman's position, I do not think I exhibited much unwillingness to enter upon anything new that seemed to be good for Queensland. The sphere of work of the Department of Agriculture is largely one of assisting in the education of farmers, or the procuring for them of that scientific knowledge and experience which they themselves cannot be expected to get. That is the basis and the justification of the Department. There are many things that individual farmers cannot be expected to do. But to go and do for them the business of certain men would be a great mistake, and in nine cases out of ten it would end in failure. No breeder can guarantee the result of his mating. It cannot be done. I believe thoroughly in the principle of a tax on stallions. I have always felt in favour of it, and shall always be disposed to support it. My main reason for being a supporter of the tax is this: Queensland has, in the horse-growing industry, a national industry if she takes care of it. Her name has suffered through the inferior product that has gone out of Queensland. It is an asset which every individual in the State has an interest in, and it is the business of the State to see that its own interests are protected, and that the best returns are obtained from the industries which the people undertake.

Mr. J. T. BELL, M.L.A. (Dalby): I find it difficult to believe that there is any large body of qualified men in the country who would deny the proposition that the horse stock of the colony has rather deteriorated, or, which will suit my purpose equally well, that it is a great deal below the standard of excellence that it could easily attain to. There is abundant evidence that not merely is it below the point to which it might easily rise, but that it is deteriorating. There is a body of men who purchase horses annually for export to India, who sell them to the critical judges that represent the Indian Government, and to the private buyers that are found in Calcutta, Bombay, and Madras. Those men have been at the industry for years. I remember coming back in a steamer from Ceylon with a number of them about twenty years ago, and I can testify to the keenness they evinced in their trade. The chief of these men gave evidence before a commission appointed by the Indian Government recently, and those Indian buyers were, on this subject, I submit, well qualified and impartial, and they unanimously testified to the fact that there is a serious deterioration in the horses of Australia, and they made suggestions for arresting that degeneration. One of their recommendations was a stallion tax. No matter what Mr. Deacon may say as to the opinion offered by his son with regard to the Queensland horses in South Africa, the fact remains that the impression left with regard to Queensland horses was unfavourable, not merely in the minds of the War Office authorities, but in the minds of others as well. Lord Down reported on the matter, and he arranged a table showing the relative values, in his opinion, of the horses of Australasia. At the head of the list he placed New Zealand, and at the bottom Queensland. So there is evidence to establish the proposition that our horses are deteriorating. Now, why are they deteriorating? In my opinion, because we have better facilities for breeding horses than probably any other country in the world. It is those facilities that are our ruin. They are fatal facilities. If there were less facilities for breeding horses in Queensland, we should certainly have fewer horses, but the type all round would be an infinitely better type. We want to instil a little more responsibility into those men who breed horses, whether they breed them on a big or a small scale. At the present time it is not necessary to resort to artificial feeding in order to keep horses alive. It is not necessary to consider what your expenses are going to be. If a man wants to breed a horse, he sends his mare to a stallion, or he keeps a brute of a colt for his own stallion, and that is about all he does in the matter. Now, we want something that will arrest that thoughtlessness, and make a man think twice before he breeds a horse. One gentleman advocated that we should start stud farms. It may or may not be a good thing to start stud farms; but in a community like this, where you have got to go to the Government, you have got to remember that there is something else to be considered. The establishment of stud farms would involve the expenditure of money, and there has scarcely been a period when there has been more difficulty in getting money out of the Government than at present. If it were an excellent idea, and I am not enamoured of it, the probability of getting the Department, or the Government, or the Parliament to agree to it is exceedingly remote. Coming down to possibilities, I say the simplest way of arresting the deterioration that is going on, and putting our feet on the first rung of the ladder that I hope will ultimately take us up to the highest standard of excellence, is to put on a stallion tax, and to make every man who keeps a horse know that there is some responsibility in doing it—that he owes something to the reputation of the community in which he lives. What are we do with that money which we collect? Under the Bill I brought in on two occasions (and I find the greatest opposition to the proposal comes from men who have never read the provisions of the Bill), the money that is collected in a district is placed under the direction of a body of men whom I may call a stallion board. I made the districts to coincide with the present sheep districts. The board, which would be called the stallion board, would consist of three or five men, and the money collected from the tax in each district would be placed under the direction of the board. The board would announce to the public that it had a certain sum of money, and that at a certain place in the district, probably at the annual local show, they would award a certain sum of money to the owners of approved stallions on the condition that the animals would be travelled in certain parts of the district to serve mares at a low figure, which the board would fix. The number of mares would, too, of course, be restricted. The stallions would then be brought in; those that were approved of would receive a bonus, and those receiving it would have to comply with the conditions of the board as to travelling in the district and receiving mares at a certain fixed fee. Under the Bill there is power for the making of regulations by the Governor in Council under which it might be said that the owners of a small number of mares would have priority over those with large numbers, and under which every precaution would be taken for the protection of the small breeders. Under that measure, so far from the poor man being placed at a disadvantage it is confident that with the conditions as they now prevail he would be at an advantage, because he would have opportunities of getting his mares served by approved horses at a low fee. At present he must have his mares covered by an inferior stallion or else pay a high fee for a good stallion. As far as we can forecast the results of this proposed legislation, it is probable that the small men will have an opportunity of getting his mares covered by a good horse at a low fee. I may tell you that in Great Britain the principle is in force in the shape of King's premiums.

The CHAIRMAN: The question of the deterioration of horses, as it affects this meeting and farmers in general, is not a question of sentiment, but a question of profit. We know that horses are cheap. Inferior animals you can hardly give away, but good horses are dear. But why? They are dear because they are scarce; and if they were plentiful, their prices would fall. With regard to the statement that there is deterioration, I really do not pay much attention to the condemnation of Queensland horses pronounced in South Africa. The Queensland horse never had a ghost of a show there. I have seen horses sent from Queensland to South Africa which, if they had been properly treated, would have done good work there, and have been alive to-day. As a matter of fact, however, they were sent over there by steamer, taken off the boat, shut up in a train, sent up the country, and immediately put to work, which is treatment that would have killed a donkey. With regard to breeding horses for military purposes, it must be remembered that before a man starts breeding he must know what type of horse his market demands. It may be one class of horse, or it may be another; and if the type of horse which he expects to meet the demand for varies from time to time, then the more expert the breeder the more likely he is to miss the market. Just as when a good marksman fires at a target and misjudges his distance, he must miss the mark, while a tyro might hit it, so is a good breeder likely to have left on his hands horses for which the demand has ceased. A friend told me that the opinions of the Indian buyers vary. One man wants one kind of horse, and a second man another; what one man buys, another man rejects. How can a breeder arrange for a thing like that? My friend told me, moreover, that there are four distinct types which the Indian buyers want, and that none resembles the others very much. I defy any mortal man in the world to pick out stallions or establish stud farms to supply an indefinite kind of horse. Another thing is, that of late years the type of horse that is wanted for military purposes has more or less changed, and is still changing. Military tactics have changed. War authorities are going in for mounted infantry instead of for cavalry. Before you breed a horse, you must form in your own mind some type to which you are endeavouring to conform, and that is a very great difficulty. You have got to find out from the buyers what class of horses they want, and it is a most disheartening thing, after you have been told by one military gentleman that such and such a horse is the proper type, to be told by another that he does not want anything of that class.

SIXTH SESSION.

WEDNESDAY, 8TH JULY, 1903, 2·15 P.M.

Business was commenced by Mr. A. H. Benson reading the following essay on—

SCIENCE AND FRUIT CULTURE.

[By ALBERT H. BENSON, Instructor in Fruit Culture.]

Some eight years ago it was the privilege of the writer, when Fruit Expert to the New South Wales Department of Mines and Agriculture, to read a paper in Brisbane before the Australasian Association for the Advancement of Science on "How to Grow Fruit." As this paper has in all probability been read by very few of the fruit-growers of this State, and as it deals in parts with the relationship existing between science and fruit culture. I purpose following somewhat the same lines I then took, at the same time bringing my remarks up to date, and dealing with Queensland particularly, and not with Australasia as a whole.

The progressive fruit-growing of to-day is by no means unworthy of being called a science, as the fruit-grower who wishes to keep abreast of the time depends largely on the practical application of scientific knowledge for the successful carrying on of his business.

There is no branch of agronomy in which science and practice are more closely connected than in that of fruit-growing. Every operation of the fruit-grower is or should be carried out on scientific lines; and the best methods of propagation, pruning, cultivation, manuring, treatment of diseases, and preservation of fruit when grown are all directly or indirectly the result of scientific research.

The services of the agricultural chemist, pathologist, entomologist, botanist, and scientific agriculturist are also being continually called for to assist in developing one or other of the many branches of the fruit-growing industry.

I am glad to say that our fruit-growers are beginning to realise the important part science occupies in their work, and that the old, careless, happy-go-lucky manner in which our orchards were managed only a few years since, is rapidly becoming a thing of the past.

The old easy-going methods of fruit culture are by no means as profitable to-day as they were a few years since, and the successful fruit-grower finds that he must move with the times, call in the aid of science to assist him in every branch of his work, grow nothing but first-class fruit, and work, not only with his hand, but with his brain as well.

Fruit-growers owe many things to science, but probably the work of the practical economic entomologist has done more to assist the industry during the last few years than any of the other branches of science, as, were it not for their careful investigations into the life histories of the numerous insect pests which affect our fruit and fruit trees, we would not now be able to grow many fruits profitably, particularly in the older fruit-growing centres. It is to the investigations of entomologists that we owe the discovery of the remedies with which to fight and keep fruit pests in check, and, had science done no more than this for the fruit-grower, he would still be under a heavy debt of gratitude. Science has, however, assisted the fruit-grower in many other ways, and whilst speaking of fruit pests the work of the vegetable pathologist occupies a position of equal practical importance to that of the entomologist. The many minute fungi attacking fruit and fruit trees have received careful study at the hands of vegetable pathologists, and it is owing to their investigations that fruit-growers are now in possession of the knowledge of how and when to treat, or in many cases to entirely prevent, the ravages caused by these minute but often extremely destructive vegetable organisms. Chemistry has also done much for the fruit-grower, as it has demonstrated the importance of an accurate knowledge of the chemical and mechanical condition of our soils. It has also shown us the particular plant foods that are removed from the soil by the various kinds of fruit, and the absence of which in the soil in an available condition renders the soil unprofitable till such deficiency be made good. It has shown us the particular class of soil that is best adapted to the production of the various kinds of fruit, as well as what plant foods require to be added to such soils in order to render them capable of producing a maximum return of the highest quality. The laws governing the initial preparation of the soil for an orchard and its subsequent cultivation, irrigation, and manuring are all based on chemical knowledge; and not only this, but when the fruit has been successfully grown, its profitable distribution and utilisation still call for the services of the chemist. In this particular we still require further information, as the methods at present in vogue, particularly as regards the oversea carriage of fresh fruits, are by no means perfect; nor are the laws governing the chemical changes undergone by various fruits during transit clearly understood. Botany, or rather the work of the scientific botanical propagator, or, as he is termed in America, originator, has also done great work for the fruit-grower. By careful breeding, or as it is termed cross-fertilisation, as well as by systematic selection, many new varieties of fruit of especial excellence, and particularly adapted to certain conditions and for certain purposes, have been raised; and this important work is being carried out by a small army of scientific men in many parts of the world, with the result that more profitable varieties of fruits are being originated and distributed, and older, unsatisfactory, and less profitable kinds are being done away with. In this branch of fruit culture much remains to be done, as not only will better fruits be the result, but I believe that it will be possible to produce varieties of various kinds of fruits having a much wider climatic range than at present, and also having the power to resist disease in a marked degree. A little has already been done in this respect, but at present we are only on the fringe. There is a wide field for scientific research, and time is necessary in order to obtain results, as this branch of work is one that cannot be hurried.

From these few examples that I have given I think I may fairly claim that I have proved the statement that I made at the commencement of this paper—that the progressive fruit-growing of to-day is by no means unworthy of being called a science, as its success depends so largely on the practical application of the results of scientific investigation.

For the information of fruit-growers generally, and for beginners in particular, I now purpose giving a few remarks on "How to Grow Fruit," the remarks being based on the practical application of scientific knowledge.

HOW TO START AN ORCHARD.

The first consideration of anyone about to plant an orchard is, naturally—What shall I plant? And, having decided on the kind or kinds of fruit to be grown, the second consideration is—Where shall I grow them?

It is impossible to devote too much attention to these primary considerations, as the ultimate success of the orchard depends largely on its being properly started. No fruit should ever be planted in an unsuitable soil or situation when there are any quantity of suitable sites available, even in our oldest fruit-growing districts; neither should any fruit be planted that will not grow to the greatest perfection, except a small quantity required for home use or to supply a purely local demand, as it will not pay to attempt to grow any fruits in quantity that can be produced elsewhere under more favourable conditions, of a superior quality, and at a lower rate.

In selecting a site for an orchard, climate, soil, situation, drainage, rainfall, shelter, water, and market facilities have all to be taken into consideration; but their relative value depends largely upon the class of fruit that it is proposed to cultivate.

As to climate, we have anything that one may wish for, from tropical to temperate, and, as a consequence, we can grow to perfection within this State practically the whole cultivated fruits of the world; in many cases the fruits grown here being superior, both in size and quality, to those of the countries from which the fruits were originally obtained.

The soils best suited for fruit-growing are deep friable loams or sandy loams having an open subsoil, and thus possessing good natural drainage. These soils are easily worked, and retain moisture well under a thorough system of cultivation. Though not necessarily very rich soils, yet when of sufficient depth they contain as a rule a sufficient amount of plant food for the proper development of most fruits, and should they be deficient in any essential ingredient they respond well to the application of manures containing that ingredient; in fact, they constitute the best matrix with which we can have to work. Heavy clay soils, or loamy soils having an impervious clay subsoil, are unsuitable for fruit culture, as they are expensive to work, bake and crack badly in dry weather, and retain stagnant water around the roots of the trees planted in them during the wet season.

The best situation for an orchard is one that is well protected from heavy winds, cold winds, or hot winds. Personally, I prefer the land as level as possible, as it is then easier to work, and is less liable to wash during heavy rains. Many growers prefer a gentle slope to the north-east, as such a situation is usually a warm one, and is not so exposed to bad winds.

All soils that are without an open or porous subsoil require draining before they are suitable for growing fruit, as there is no more frequent cause of orchards failing than the want of drainage. The accumulation of stagnant water about the roots of the tree and the want of aeration in the soil are also the primary causes of many of the worst diseases of fruit trees. The question of drainage is, therefore, of the first importance, and no soil is suitable for fruit culture unless it is thoroughly drained—either naturally or by artificial means.

A good shelter against heavy winds is also of great importance, and where it does not exist naturally in the shape of a belt of timber or a background of higher land, then it will always pay to provide an artificial shelter, say, a double or triple row of any quick-growing trees that are suited to the district.

An abundant supply of good water is of the first importance to fruit-growers in every part of this State, as, no matter how great the average rainfall may be, there are always times when the trees require water, and the absence of sufficient moisture in the soil prevents the grower from obtaining the best results from his trees. Every orchardist who has the means of doing so should either conserve all the water he can in times of plenty for use during dry spells, or, given a good underground supply or a permanent creek from which to obtain it, should provide himself with the means of raising and utilising such water.

Having decided on the site of the proposed orchard, the first question is the preparation of the land. This is a very important factor in the future success of the orchard, and requires to be thoroughly carried out, as an orchard, once planted, lasts for many years, and, unless the ground is thoroughly prepared prior to planting, it is difficult to get it into the perfect state of tilth so essential to the production of the best fruit. Clear and stump the land carefully, reduce the surface soil to a fine tilth, and subsoil as deeply as you can. The first cost may be heavy, but it will pay handsomely in the end, and it is better to get 1 acre of land thoroughly prepared prior to planting than to plant a considerably larger area first and then start to get the land ready afterwards. As I do not propose dealing with details in the present paper, but will confine my remarks to generalities, I beg to refer all who are interested in the preparation of the land, or other matters to be presently dealt with by me, to my writings that have appeared from time to time in the departmental publications of this State and also of that of New South Wales, and will now deal with the question of

How to Plant and What to Plant in an Orchard.

Before planting an orchard the first thing is to see that the ground is well laid out, so that when the trees are planted the rows will be straight in every direction, as nothing looks worse than a badly planted orchard. Correct planting is also a great assistance to cultivation, for when the trees are planted anyhow it is impossible to do as much or as good work with horse cultivation as when the trees are planted symmetrically. The orchard may be laid out in the manner that is considered best, opinion differing somewhat in this respect, the systems usually in vogue being the square, hexagonal, quincunx, and alternating squares. As a general rule I prefer planting in squares; the distance between the rows being the same both ways, and I consider an orchard so planted the easiest to cultivate.

Whatever system of planting may be adopted, the following particulars should always be carefully attended to:—

Never plant deeper than the young trees were planted in nursery; too deep planting kills many trees.

Never dig a deep hole where the land has an impervious subsoil; it is simply making a basin to hold stagnant water, which sooner or later will kill the tree.

Never place any manure round the roots when planting. If it is desirable to use any manure, mix it thoroughly with the soil before applying.

If the land has been properly prepared, and is in good order, there is no necessity to dig large holes; the holes should be just large enough to allow the roots to be well spread out.

Always keep the centre of the hole rather higher than the sides, so that water may drain from and not towards the trunk of the tree.

Place a little fine top soil over the roots, and press the roots firmly into it.

If the soil is dry, 5 to 10 gallons of water can be given now with advantage, and when this has soaked in the hole can be filled in carefully. Watering in this manner is preferable to watering from the surface, as the water goes right where it will do most good, and the mulch of soil on the top of it tends to prevent caking of the soil and consequent surface evaporation.

Always plant yearling trees when obtainable—that is, trees one year old from the bud or graft. They bear the shock of transplanting better than two-year-old trees, and they usually make stronger and more symmetrical trees. Carefully trim the roots before planting, and cut the top back hard when planted. If you do not cut back at planting, the result will be a badly grown, straggling tree, that will make anything but a vigorous growth; but by cutting back hard you will obtain a strong and vigorous growth, and that just where it is wanted—namely, the trunk and main branches—for unless you start your tree with a good foundation you will never build it up into a strong and well-grown tree. The height at which to head the tree should not exceed 2 feet in any case; and where the climate is very hot and dry, 1 foot is better than 2. This has been amply proved by experience in all hot countries.

Do not plant your trees too close together. Twenty feet apart is the least that that should be allowed for any fruit; and many varieties are much better at 25 or even 30 feet apart. Though the returns are not so large at first as when the trees are planted closer together, the orchard will last longer and pay better in the end, in addition to which it is much easier cultivated, as there should always be ample room for the use of horse-power in orchards both for cultivating the ground, spraying or cyaniding the trees, and for gathering the crop.

What to plant in an orchard depends entirely upon the climate; and, as previously stated, nothing should be planted that will not grow to the greatest perfection; and not only this—no fruit, except it is of especial merit, should be grown. All inferior fruit should be set aside, and only a few varieties—and these the very best—should be planted, as one of the greatest mistakes made by our fruit-growers is the planting of far too many varieties, many of which are practically valueless. The insane habit, which is so frequently met with, of crowding every variety of fruit that can be obtained into one orchard cannot be too strongly condemned, as it is to this cause more than any other that the large amount of worthless and inferior fruit which is flooding our markets and injuring our fruit trade is due.

When the soil and climate grow such fruit as peaches and apricots to perfection, grow peaches and apricots. Where late apples of fine quality and good keepers grow, by all means grow late apples; and where citrus fruits grow to perfection, grow citrus fruits. Don't try and grow oranges where you should grow apples, or peaches and apricots where you should grow oranges—it won't pay; just stick to what your soil and climate will grow best. There is more money in that than in trying to grow fruits under unsuitable conditions.

When planting an orchard, don't plant fruit that is only valuable for consuming fresh, unless it possess special qualifications, such as earliness or good shipping qualities, as when the supply is in excess of the demand, the excess cannot be profitably absorbed by canning, drying, jam-making, or exporting. As a consequence the market becomes glutted and prices fall to such an extent that the fruit cannot be produced for the price it realises.

Plant fruits that, in addition to being of first-class quality fresh, are also valuable for canning, drying, or jam-making, so that should one market fail there are others to fall back upon, and you will thus have several outlets for your fruit.

How to Look after an Orchard.

I stated, when speaking about preparing the soil for an orchard, that it was far better to do 1 acre well than 2 acres badly, and in managing an orchard this is equally true. Never handle more than you can manage, but whatever quantity you work let it be done thoroughly. There is no branch of agronomy that requires more careful or thorough work than that of fruit-growing; neither is there any branch that will pay better for extra care and thorough attention. Rest assured that, if fruit-growing will not pay with thorough attention and cultivation, it most certainly will not pay with neglect. Therefore I say to all those who may think of going in for fruit-growing that, unless you make up your mind to go in for it thoroughly—which is the only way to grow high-class fruit, which alone will pay—you had better leave fruit-growing alone, and take up some easier business. Don't run away with the idea that all you have to do is to dig a hole in the ground, stick a tree in, and that it will want no further attention, or that when a tree has come into bearing all you have to do is to gather the fruit and send it to market. If you do, you will, in the words of our American cousins, "be badly left," and will come to the conclusion that fruit-growing is not by any means the simple and easy business you thought it was.

If an orchard is expected to pay it must be properly looked after, and to do this it is necessary in the first place to keep the land in the highest state of cultivation. The land must be well and deeply worked, not scratched, and every weed must be eradicated during dry weather. No man can afford to grow weeds and fruit in the same ground, as every weed is robbing the trees either of moisture or plant food which are required by the trees to properly develop their crop. Thorough cultivation is also the best and only satisfactory method by which moisture may be retained in the soil; therefore it is of the first importance in our drier districts. Plough the orchard during the winter, and use the cultivator during the summer unless, owing to continual wet weather, weed growth becomes excessive; in which case the plough is necessary. If you want to retain moisture, stir the land often and stir it deeply, but don't turn it over, and this will prevent the loss of moisture by surface evaporation to a very great extent.

Use improved implements of cultivation. In these days of keen competition, hand labour is altogether out of the question, as it will not pay to do anything by hand that can be done cheaper and better by horse labour.

Irrigate the land when necessary, taking care to distribute the water evenly, so that one part of the land shall not be flooded whilst another part has not enough. When irrigating, use sufficient water to saturate the soil, but no more. A surface watering is of little good; the moisture must get right down to the feeding roots of the trees if the best results are to be obtained. Irrigation should be combined with thorough cultivation, as the land should never be allowed to become caked either after an irrigation or after a heavy rain. Run a cultivator over the land as soon as it will carry a horse, and keep the surface well tilled, by which means a large amount of moisture, which would otherwise be lost by surface evaporation, will be conserved for the trees' use.

In order to grow good fruit it is also necessary that the trees shall be properly pruned, not only that the tree may be made to grow symmetrically, and to produce the bulk of its crop along the main branches instead of at the extremities of the limbs, but also so that the tree shall not be allowed to bear more fruit than it can bring to perfection. Though the number of fruit on a tree can be greatly reduced by judicious winter pruning, it is often necessary, especially in the case of stone fruits, to thin heavily, as small stone fruits are generally of very little value, and, in addition to being almost unsaleable, when allowed to remain on the trees in large quantities, they are a very severe strain on the trees' energy, as every stone contains the germ of a young tree, to form which takes much more out of the tree and soil than growing a heavy crop of large, fleshy fruit. When trees are shy bearers, summer pruning and root pruning will cause the formation of fruit-bearing wood. Winter pruning forms wood; summer pruning forms fruit.

Always head your trees low. The advantages of the low heading are: Protection of trunk and main branches from sunburn; ease in gathering the fruit; less liability to damage by heavy winds; increased facilities for using the horse in cultivation, and ease in pruning, spraying, &c.

Head low, giving the main limbs an upward and slightly outward growth, but not spreading till they are out of the reach of the horse. Trees thus pruned are stronger, and able to carry more fruit than unpruned trees, as the weight of the fruit is borne directly on the main branches, the strain being nearly vertical, and with improved implements the ground can be cultivated by horse labour right up to the trunk of the tree without any danger of injuring the branches of the tree.

When the branches of the tree are allowed to spread too much, the weight of the fruit tends to break off the limbs or split the tree, but this is by no means all the damage, as the head of the tree is opened up and exposed to the direct rays of the sun, which scald and blister the unprotected bark—producing a hidebound condition that leads to gumming, attacks by boring insects, and other diseases.

Another most important consideration in looking after an orchard—in fact, I may say, the most important consideration of any—is to keep the orchard free from the ravages of insect and fungus pests as far as it is possible to do so.

Every orchardist should make himself thoroughly acquainted with the appearance of every disease that the fruit or fruit trees he is growing are liable to, so that he may be able to detect the presence of disease as soon as it makes its appearance. This is of especial importance in the case of fungus diseases, as these diseases, if taken in hand in time, can be usually easily kept in check, but if neglected they spread so rapidly, and obtain such a thorough hold of the orchard, that it requires very careful treatment to bring the trees round to a healthy condition. Never consider any blemish of the fruit or tree, no matter how insignificant it may be, as of no consequence. It may be of no consequence, but it may be the first indication of a disease that, unless it is stamped out at once, will overrun the orchard. Therefore treat all blemishes as diseases till you have proved them to be harmless.

The various diseases of fruit and fruit trees are most economically and efficaciously treated by means of cyaniding or spraying. In the latter case the remedies used are distributed over the trees affected with considerable force so as to reach every part of the tree, and in as fine a state as possible. The object of spraying is not to drench the tree, but to distribute the material used evenly and finely, as this is found to be far more efficacious than flooding one part of the tree and missing another, as to be successful every part of the tree must be reached.

In spraying for microscopic fungi it is impossible to get the spray too fine or too well distributed, as the spores of the fungi are on every portion of the tree, so that to be successful the spraying must be thoroughly done. The time to spray varies with the disease; but in the case of the fungus diseases of deciduous fruit trees the best results are obtained by spraying (first) when the buds are swelling in the spring, and (second) when the fruit is setting, the subsequent spraying, though of value, being not nearly of so much importance as the two mentioned. Fungus diseases attacking ripe or ripening fruit are best prevented by spraying the trees liable to attack as soon as the first signs of ripening take place, as the spores that would cause the disease are thereby destroyed. In the treatment of insect pests the remedies will depend on the habits of the insects to be destroyed. Thus all insects that live by eating their food are very easily destroyed by poisoning the food on which they are feeding with a preparation of arsenic, such as Paris green or white arsenic and lime, whereas

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insects living by suction, such as aphides and scales, can only be destroyed by spraying them with a material that kills them on touching them or by cyaniding.

The use of hydrocyanic acid gas for the destruction of all scale insects is well known in most parts of the State, and is steadily extending. Either it or spraying and often both of these methods of destroying fruit pests, are an absolute necessity in most of the citrus orchards in this State, and the spraying of deciduous trees is very often so.

There is one other question of great importance in the management of an orchard to which I will briefly refer, and that is the question of manuring. In order to obtain the best results from manuring, it is necessary to make a thorough study of the plant or tree's requirements, taking the nature of the soil, climate, and rainfall into consideration. Plants, like animals, require their food regularly, not a surfeit to-day and no more for a year or longer; a regular and constant supply of the essential elements of plant food will always produce the best results. Manures may be roughly divided into two classes—those readily soluble and at once readily available for plant food, and those only slowly available after they have been for some time in the soil. Soluble manures should only be given during or slightly prior to a period of active plant growth, as, if not used by the tree, they are often, especially in the case of sandy soils, leached away, and so lost to the plant; but slowly soluble manures are best applied whilst the trees are dormant, so that they can be available when the period of of active growth takes place. Extremely soluble manures should never be used during a dry time, unless irrigation is available, as they are more likely to do harm than good, as, if they come into direct contact with the roots, they have a burning effect in dry weather. Therefore, these manures are usually of less value in a dry climate or comparatively dry climate than where a regular rainfall can be depended upon. In using soluble manures it is not advisable to give too large dressings; smaller amounts more frequently applied will be found to give much better results.

HOW TO UTILISE AND MARKET FRUIT.

Having now shown how to plant, what to plant, and how to look after an orchard when planted, I now come to the important question of what to do with our fruit when grown, so that it will produce the best results.

Fruit, to sell well for the fresh fruit trade, must always be shown to the greatest advantage, and this can only be done by careful picking, handling, grading, and packing, and the use of clean, neat cases.

Handle the fruit carefully; a bruised fruit is a spoilt fruit, and will spoil the sale of a case. Grade evenly, and never pack big and small fruits in the same case. Pack honestly; let the top of the case be no better than the bottom, but let the fruit be of an even quality throughout. Pack firmly, and discard all blemished or diseased fruits; they only spoil the sale of the good. If the fruit is of extra quality, or has to sent a considerable distance to market, or is intended for export, always wrap it, using a soft, tough paper, glazed on one side.

Honest packing and even grading are essential to the establishment of a profitable export trade, as unless the fruit is of first-class quality, evenly graded, and well packed in neat and attractive cases it is no use trying to build up an export trade. The English and American trade demands a first-class article, for which they pay a good price for a practically unlimited quantity, but second-rate and inferior fruit they do not want at all.

In addition to disposing of our fruit fresh, there are several methods by which it may be profitably utilised that are at present not fully taken advantage of, the principal of which are canning, the manufacture of fruit pulp, jam, jelly, or marmalade.

In order to dispose of our fruit to the best advantage, I am strongly in favour of co-operation amongst fruit-growers. I advocate the establishment of centrally located packing, curing, and canning, jam-making establishments, where the fruit will be properly graded and put to the use that it is best suited for; thus fruit that is best adapted for the local fruit trade will be consumed fresh, that best adapted for export will be exported, that suitable for canning will be canned, and that suitable for pulp, jam, jelly, or marmalade will be so utilised.

Such establishments should be adapted to the requirements of the district where they are erected, and should be worked, as far as possible, on co-operative lines. They will require to be run by thoroughly competent men, who must be experts in the business, and who will put up the fruit in the best possible manner. It is of the greatest importance that the quality of the output should be of the highest grade, and that this standard of excellence be maintained, as unless this is done the establishment will be a failure Such establishments can handle the fruit cheaper, better, and much more expeditiously than private growers, and they have the advantage of being able to put up the fruit, whether fresh, canned, or otherwise, of a uniform standard quality, and to maintain this standard—a matter of the greatest importance when selling the produce.

Every fruit-grower should put up all the fruit he requires for home consumption, as this is easily and inexpensively done, but I do not advise the average fruit-grower to go in for canning or jam-making on an extensive scale, as I feel sure the result will, in many cases, be very far from satisfactory; rather join together and get a really good man, who thoroughly understands the business, and who can turn out a first-class article. In conclusion, I may say that the secret of successful fruit-growing is thoroughness; nothing will pay to do ill that will not pay very much better for doing properly. Choose suitable soil; prepare the land properly; plant your trees well; plant nothing unless it will grow to perfection, and only plant few varieties. Look after your orchard thoroughly; cultivate it well; prune it well; thin heavy crops, and keep down all diseases, and when your orchard has come to bearing you will have good fruit, which, if carefully handled, well and honestly packed, will sell well in any market, no matter whether it is fresh, canned, or otherwise. Fruit-growing conducted on these lines will pay well, but the days of growing rubbish at a profit are past.

At the conclusion of Mr. Benson's paper, Mr. D. Smith, of Baroon Falls, Blackall Range, exhibited some fine specimens of oranges, mandarins, and lemons.

DISCUSSION.

Mr. G. Fewtrell (Palmwoods): Mr. Benson's is one of the most instructive papers on fruit culture that anyone could wish to hear, for it furnishes the growers with every necessary particular for growing fruit, selecting land and what to do with it. I am an old fruit-grower, and I have been twenty years within a few miles of where the fruit, that Mr. Smith has exhibited, was produced. I can endorse the sentiments of the paper, and can state that if anyone wishes to go in for fruit of any description he cannot do better than read it. I well remember, before Mr. Benson came to Queensland, the kind of fruit produced; and when we see the fruit that is grown in the State to-day, I think we must attribute a great deal of the improvement to the energy and perseverance of Mr. Benson since he came here.

Mr. W. S. Palmer (Bowen): I would like to add my testimony to the value of the paper that has just been read. The question of shelter was a valuable point that was brought out in it, and I know of one orchard in my district this year which, through being in a sheltered spot, saved its crop, while the rest of the orchards, on account of the cyclone, lost everything. Another great point is what is said about irrigation, and I may say that, prior to Mr. Benson coming to our district, we, in Bowen, lost a great deal, but since he visited the place we have been able to send our fruit to Melbourne without any loss whatever, which, of course is a great thing for us. Last year, when Mr. Benson visited Bowen, he advised us to use the lime, sulphur, and salt wash for the purpose of keeping down pests. This was adopted by our growers with great success, and for that bit of advice alone he has our best thanks. He also advocated the use of manure, and advised us to go in for the meatworks fertiliser, which has been found by those who of us have tried it to be a very good thing for fruit trees. Our trees this year are in a really good state, and I think it is all in a great measure to what he recommended us to do in the way of manuring. Another thing Mr. Benson introduced into the Bowen district was the Californian pruning saw. Before he came there we used to go round and use an ordinary saw, which is a very awkward instrument to use on a fruit tree. He, however, showed us how to take the inside out of a tree with this pruning saw. Since then we have adopted this implement, and find that it saves a great deal of labour. I should strongly recommend anyone who has any pruning to do to go in for one of these tools. With regard to keeping down pests, it would be a very good idea if the growers in their own districts would appoint local inspectors to go round among the orchards, as we have done in Bowen. I myself am now an honorary inspector under the Diseases in Plants Act, and I have the power to go into an orchard and inspect the fruit trees, which I think will tend to make growers more careful in keeping their trees clean. There is very often a great interval between the times when an expert visits a place, and we want someone to go round to keep the growers up to the mark in the keeping down of pests.

Mr. R. Hoggan (Ballandean): I also desire to add a few words in support of what Mr. Benson has done for fruit-growing in Queensland, particularly in the Stanthorpe district. He has shown us how to prune, so that in the course of years we shall have trees which will be trees, and bear large quantities of fruit, instead of trees that are so small that they have no area at all on which to carry fruit, and which would have been much better if they never had been pruned at all. He has introduced new implements, such as the Californian saw, and, moreover, he has got, what some people have not, that amount of judicious suavity which enables him to get on with everyone he comes in contact with.

Mr. W. Fielding (Redland Bay): I well remember the Smith Brothers, one of whom has exhibited the samples of citrus fruit you see before you to-day, going to the Blackall Range, and I think those gentlemen have had a very great deal to do with the transformation of that district. They started a nursery, grafted trees, have sent out plants all over the place, and have certainly worked wonders in developing the Blackall Range. I do not think Mr. Benson mentioned in his paper the best spray for citrus fruits. In Redland Bay we find castor oil with sulphur the best thing to put on the trees. It is better than the salt mixture, because the latter washes off during heavy rains, whereas the castor oil sticks to the tree. It certainly has proved the best thing that we have tried for the stems of the trees.

Mr. P. S. Hungerford (Woombye): On behalf of the society I represent, I have also to express my appreciation of the services rendered to the fruit-growing industry on the North Coast line by Mr. Benson. Speaking for my own district, I may say that the Department of Agriculture has accomplished work, through Mr. Benson, the value of which it is hard to estimate. One gentleman referred to the pruning saw, and I can say that the labour saved by the introduction of that one implement means a tremendous lot when it is applied over a whole district.

Mr. G. Turner (Bowen): I would like to add my testimony to the good Mr. Benson has done in going about among orchardists. In his paper to-day he has only added to the debt which fruit-growers owe to him. As an illustration of the interest which fruit trees repay on a little care, I may say that I know two orchards within half a mile of each other—one containing eighty trees, and the other 300. The former yielded a much larger return than the latter; and the only difference is, that the man with the eighty trees attends to his, and the other does not. Mr. Benson mentioned the question of canning surplus fruit, and I was glad to hear his remarks on that point. We are thinking of going in for it in our district, and we think we could get a market for a large quantity of fruit if it were canned. There is a difference of opinion among us as to whether each man should can his own fruit, or whether we should form a co-operative company, adopt a brand, and keep up to a certain standard. Personally, I think the latter is the best course to be followed. We cannot boast of the proceeds from our district this year. Our crop was shaping beautifully, when we were visited by a cyclone, and we lost £6,000 worth of fruit within twenty-four hours. It was a big blow to the orchardists, but they are doing the best under the circumstances, and the acreage under trees is being increased.

Mr. G. Martin, M.L.A. (Childers): In the opening sentence of his paper, Mr. Benson mentions his former connection with the New South Wales Department of Agriculture, and this recalls to my mind that some years ago the National Association of New South Wales gave a prize for the best essay on how to treat our surplus fruit for exportation. There were three essays sent in, and I wrote one of them. Mr. Benson happened to be the judge, and I am going to judge Mr. Benson's paper now, although I do not believe that till this day Mr. Benson knew I was a competitor. Mr. Benson gave me three points out of five, which was the highest, but he also wrote against it, "Not worthy of an award." If you read a history of the orange you will find that in the early times the orange was a small poisonous berry, and the question arises as to whom we are indebted for the modern orange. The answer is that it was to men who, by careful study and scientific investigation, backed up by such men as Mr. Smith, have brought us the fruit that we have to-day. It is the same with many of our other fruits. I say all credit to Mr. Benson for coming here and reading his paper in addition to preparing it. Our worthy Chairman referred to the importation of grapes, and the care taken in preventing the importation of diseases, and this leads me to refer an important point bearing on that subject. A seedsman imports, and, for the sake of making money, he imports from the cheapest market. I have seen consignments of fruit trees sent up to Queensland for sale by auction. Men have come along and pointed out the diseases among those trees. These trees would have been sold if the experts had not come along, and what would have been the result? Now I think that the Government should appoint experienced men; and before any fruit trees or seeds are allowed to go into the hands of producers, they should be examined and either condemned or passed. At the present time we are spreading diseases broadcast, and it is all due to the gospel of cheapness. There is plenty of land in Queensland marvellously adapted for cultivation, although not to many of the crops we are growing at the present time. You have all heard of the marquis who tried to form a settlement on an island in the Pacific: how his Italian settlers were starved and afterwards came to New South Wales. There they took up ironbark ridge land which no one else would look at, but to-day they are growing better grapes and olives than are to be found in any other part of New South Wales. There is a great deal of land lying idle in Queensland, but I believe that there is not an acre of it but that will be one day turned to profitable use. It is only idle now because we do not understand it. Nature never invented anything yet but for some wise purpose, and it is to papers like this of Mr. Benson's that we must look to to solve the problem.

Mr. G. Butt (Montville): In our district we have had very valuable instruction from Mr. Benson, and I am speaking as one of the pioneers of our part of the country. People must crawl before they can walk, and there was many a time I had to crawl up that range before I could walk up it. I was there some two years before the Smiths came to the district, and I had planted about 200 trees. It was the growth of those trees and other things that I had planted that took the Smiths up to the range. As for the Smiths, there is one thing I can say, and that is that the trees they send out are to be relied upon. The first thing I did was to plant about 200 seedling trees. Those trees were grown there in a wild state, and I had to go in for other things to make a living. The first fruit adviser that visited me was Mr. Voller, and he said, "Look here, Butt, do you expect to get a profitable crop out of those trees and let them grow in the way you are?" I said, "Mr. Voller, as soon as those trees begin to bear and they help to make my living, I shall begin to work them, but in the meantime they have to take their chance." After about twelve months Mr. Benson came along, and he visited the several orchards that were growing in the district at that time. I do not remember that he said much about the state of the trees, because they were everywhere growing up in the same way. But in a few minutes after he made his appearance on the Razorback at that time with a pair of shears and an American saw he said, "I am going to show you fellows what to do with these trees and how to prune them." He went round and pruned a couple of trees in each orchard, giving us a lesson that has never been forgotten. Anyone visiting the district to-day will see the fruits of his work, because you can now go and spray the trees inside and out. At the Woombye Show last week, Mr. Benson said that he could not find a living insect on any of the fruit that was shown. That would not have been the case but for the advice and teaching we received from Mr. Benson. He had a battle to fight with us on the cyaniding question, for many of us were firm believers in spraying. Personally, I have now done with spraying, because I believe it is labour thrown away so far as the growing of citrus fruits is concerned. Mr. Benson showed us how to cyanide, and it was a great lesson. Practical work such as he did will do more good than dozens of books. There are three of us who, this last season, have got cyaniding outfits of our own, and pretty well every settler up there is now going in for cyaniding. The trees are fairly green all through the district, and we can gather the fruit and put it on the market without any struggling, which is a great help in the busy season of the year. Once you get cyaniding sheets they will last a long time, and they come in very useful for other things besides cyaniding.

Mr. A. WAGNER (Nundah): I have listened with great pleasure to the eulogies that have been passed on the writer of the paper, and I may say that the appreciation that has given rise to them is shared not only by the people of Queensland, but by large numbers of people in New South Wales. It has been my privilege to have been among the fruit-growers while I was down there, and they told me they lost their best man when they lost Benson. For my own part I do not think the Department of Agriculture has ever imported a better man into Queensland than Mr. Benson.

Mr. BENSON: I am very glad that you have been pleased with my paper, because I tried to give in it as much information as possible. To-night I hope to be able to meet the fruit-growers of the Conference at a special meeting, and then shall be glad to answer any questions that may be put to me. I must thank you, gentlemen, who have said so many kind things about me, for it is extremely flattering to me to feel that my work has been appreciated, and not only that it has been appreciated, but that it is resulting in good to the State of Queensland.

The CHAIRMAN: Mr. Benson has, in my opinion, and I think in every other Minister's opinion, been doing particularly good work among the fruit-growers, and it is gratifying to know that the fruit-growers generally appreciate his services, and that good practical results have accrued from those services.

Mr. E. Grimley then read his essay on—

GRASS GARDENS.

[By EDWARD GRIMLEY, Secretary to the Queensland Acclimatisation Society.]

Grass gardens are quite a modern feature in agriculture; the first-mentioned being conducted by a Mr. George Sinclair, under the patronage of the Duke of Bedford, early in last century. Since then they have increased, especially in Germany and the United States of America.

A grass garden is a portion of land devoted to the culture of grasses and other plants, not grasses usually grown for fodders. Their object is to exhibit and test the quality of grasses useful or possibly useful for forage. Such gardens are of the greatest interest, directly and indirectly, to mankind.

Grasses and fodders exist in great variety and forms, and show great diversity of character. Some are coarse and harsh in texture, whilst some are fine and tender—some make good hay, whilst others are good for pasture only—some thrive in summer, others in winter—some are vigorous and give abundant growth, whilst others are scanty. All these matters can be observed and studied in a grass garden; and when we consider that probably two-thirds of our wealth is derived from the natural herbage of the country, and when we further consider that a large proportion of the accumulated wealth of our country, amounting to many millions, has been derived from the same source, it is surely a matter of the utmost importance to see if our pastures are giving us what might be expected from them. In a grass garden an opportunity is given of comparing one kind with another, and of noting the relative merits for special purposes. Of the first importance in a grass garden would be the study of our native grasses. There we may become familiar with them, note all their peculiarities, and notice whether, under cultivation, they show any variation unnoticed in their native habitat. A careful gardener cannot fail to notice some variations, and these variations may be of great value, not only to the pastoralists but as food for man. For instance, Mr. F. M. Bailey, our Colonial Botanist, points out that the grain of the Mitchell grass has been used by the natives of Queensland as food, and further says that, possibly by careful cultivation and selection, a grain might be evolved in the same manner as has been wheat from *Triticum vulgare*, seemingly not more promising than the Mitchell grass. By careful study, any characteristic can be fixed and extended. In a grass garden may be developed any promising tendency, and stock of any superior sorts for distribution may be raised by the gardener. We may here judge the merits of any advertised fodder plant. To the botanist a grass garden would be far more useful than dried specimens in a herbarium.

So far, mention has only been made of the growth of the plants and their peculiarities, but, if desired, the usefulness of a grass garden can be extended by the expansion of the plots devoted to each variety: by calculating the returns from a small given area, we may ascertain the return per acre; comparing one with the other, we may notice variations in different soils, the adaptability to the use of fertilisers; determine those most useful for turf formation; settle the vexed question of the most useful grasses for lawns in different districts; we may determine the most useful grass for binding soils, a matter of great importance in some districts, as many of the river banks are being washed away.

In laying out a grass garden it has been usual to use rectangular plots of, say, 3 feet square, devoting more such squares where desirable, but when expense has to be considered it may be cheaper to use lines of a given length so as to allow the use of horse cultivation; but in this way the most useful quality of turf-forming is lost, and the capacity for forming turf is the most important characteristic to be tested; whilst in growing grasses in lines, the careful study of the peculiarities of the individualities of the plants can be more easily carried out.

To stock a grass garden, the chief consideration is to get pure stock, true to name—seed purchased from seedsmen is seldom pure, and care must be taken to eradicate every plant not true to name. The most reliable way to get a pure stock is to get a turf of the variety desired, and by pulling the roots to pieces to get sufficient to plant your plot—even then, there will be seeds spring up from having been left in the ground. This plan of stocking a grass garden has been carried out by a Mr. James Bradford Olcott, of Connecticut, U.S.A., who has gained a world-wide reputation by his work in this direction, having devoted over thirty years to the work, and he has now some 1,500 varieties of the grass in his garden. These grasses have been gathered from all over the world, mostly by himself, as Mr. Olcott devotes the three months when his garden is under snow to collecting other grasses in his own and other countries.

Mr. Olcott's dictum that turfs are better for forming a grass garden is explained in this way: All seedlings in grasses, as in all other plant life, differ, showing variations in some way. With variations some must be better than others, but with turfs you can, by choosing your spot, get the best and the best only and so propagate the best only.

The after cultivation of a grass garden consists mainly in keeping free from weeds and mowing. Mr. Olcott mentions that he mowed his garden ninety-two times in one year. It is essential to keep the garden mown so as to keep the turf from seeding, for if the grasses were to be allowed to seed the work would be endless, almost impossible to carry on, the seeds being carried by the wind all over the place. To be educational to the uninitiated, it would be necessary to use good legible labels, large enough to be easily read and giving as much information as possible.

It would be necessary for the manager to keep careful records of each plot, detailing every characteristic.

When we come to inquire what has been done to establish such gardens in Queensland, we find but few efforts have been made.

Some years ago Mr. Walter Hill, when Director of the Botanic Gardens, Brisbane, established a grass garden on a small scale, but it was soon abandoned. Goodness knows why! and the records are not available. The late Mr. W. H. Walker, of Tenterfield Station, informed me that he had been most successful in improving his property by sowing grasses, but he was unfortunately killed just at a time when he was most enthusiastic. So far as I can gather, the only other effort has been made by the society represented by Mr. L. G. Corrie and myself at this Conference. At the instance of Mr. F. M. Bailey, the Colonial Botanist, the Queensland Acclimatisation Society commenced a few years ago a grass garden, and some most interesting work has been done at Bowen Park, but there the land is so bad, quite unfit for experimenting on those lines, that when the drought came early everything vanished; but the society are in hopes of obtaining a piece of more suitable ground. But one small grass garden is quite inadequate for proving and testing the values of grasses for all Queensland. Grasses most suitable for our Western country are not likely to be suited to the coast, and those most suited to the South would not thrive in the North.

It is a matter beyond controversy that the pastures of Australia have deteriorated since they were occupied; the carrying capacity is reduced; the better grasses have, to a large extent, disappeared, inferior grasses have taken their place, and pestilential weeds have been introduced. Probably the deterioration cannot be exactly determined, but when we consider that the pasture lands of Australia amount to nearly 2,000,000,000 of acres, and that the actual carrying capacity of these millions of acres is considerably reduced, it is doubtful if the total revenue received equals the deterioration.

If the Governments of Australia have been so remiss in their duty as landlords in not seeing that the public estate is reduced in value, surely it is not too much to expect that they will endeavour to redeem them, and to that end they must know how to go to work, and a grass garden is the foundation of such knowledge—the A B C that will lead up to a gradual reclaiming of the deteriorated lands. Fortunately our Government has not altogether neglected its duties, as for many years that most indefatigable worker, the Colonial Botanist, has collected together information about our grasses, and has embodied in that monument of industry, "The Queensland Flora," a descriptive list of no less than 280 varieties of Queensland grasses.

Gentlemen, I have endeavoured to show you that grass gardens are necessary to counteract an existing evil, and how these gardens should be carried out; and if I should have evoked an interest in the minds of a few who should wish to be helpful in carrying out such a scheme, and receive the blessings of those who make two blades grow where but one grew, I shall be happy.

I have pleasure in acknowledging that I received some help towards the ideas contained in this paper from reading the annual reports of the Department of Agriculture, U.S.A.

DISCUSSION.

Mr. J. SOUTTER (Brisbane): We have neglected our natural grasses far too long, and we allowed the squatter in the early days to squander them. The natural grasses were eaten down, nothing was left to reproduce seed, with the result that a great many of our grasses are now lost. I would like it to be understood that plant life is the same as animal life. The organs are so constituted that they have the same means of reproducing as cows, pigs, or horses. If you allow these means of reproduction to die out, the results are that you allow your pastures to be denuded of their best grasses. Farmers are not so bad, because along the headlands there is always a certain amount of grass which is left to seed. In the Western country there is no cultivation, and I think it would be a very good thing if the squatters fenced in a few acres of the natural grasses to prevent all stock from getting on to it, eating it down, and thereby destroying the seeding of those grasses. This will enable the grass to grow and reproduce itself, and the wind may be trusted to do the rest. The seed is so constructed that it is lifted up by the wind and distributed. Another great destroyer of the natural grasses is the bush fire, which burns them out. We have had a very serious drought, which has destroyed millions of acres of grasses, and I should like someone to give us an idea of what is likely to be the result from this. The people will say we have had nice rains, and the country is looking nice and green, but I am afraid a lot of it is only weeds. The question is, How are we going to get the natural grasses back again? Our greatest industry depends upon our grasses, for it is our beef, wool, and butter that are going to make Queensland, and nothing else. If we neglect the care of our natural grasses in future as we have been doing in the past, it is certain that the evil consequences will be of far-reaching effect.

Mr. R. CLIFFE MACKIE (of Brisbane) complimented Mr. Grimley on his paper, and furnished a very interesting account of his experience of grasses in Queensland during the past fifty years.

Mr. H. A. TARDENT (Toowoomba): I thoroughly endorse the remarks of the reader of the paper on the deterioration that has taken place in our grasses. It stands to reason, if grass is being kept constantly eaten down, that it gets no chance to recover, and I know of no remedy for the trouble except to divide the land into more paddocks. While on the subject of grasses I would like to say a few words on the *Paspalum dilatatum*. It is a new grass for Queensland, but I have tried it, and with splendid results. I have sent thousands of roots to all parts of the State, and from all parts I get glowing reports of it. You hear it said that it is difficult to grow from seed, but this comes from the fact that it is difficult to get ripe seed. Green seed mixed with ripe causes fermentation which kills the ripe seed. *Paspalum* seed should not be sown too deep. On the contrary, it should be sown rather shallow. But the best way to propagate it is by roots, which I understand you can procure from the Agricultural College, Gatton. It stands dry weather, wet weather, and frost, and the agriculturist will find it an excellent standby. Like most plants, it likes good soil, but it will grow anywhere except in low-lying badly drained land.

Mr. L. N. Rosenlund (Booyal): I have seen a new grass in our district which has appeared since the drought. I never saw it before, but it now appears to be taking the place of the other grasses that used to grow in the district. It seems a good grass, but I would like to know whether there are any means by which I could find out what it is and where it came from.

Mr. P. McLean (Agricultural Adviser): Send it down to the Department of Agriculture when it is in flower or seeding. Mr. Bailey, the Colonial Botanist, will identify it for you.

Mr. E. Grimley having replied, Mr. George Fox, M.L.A., gave the follow- address on—

THE AGRICULTURAL BANK ACT AMENDMENT BILL OF LAST SESSION.

[By G. Fox, M.L.A.]

During last session of the Parliament of this State I introduced a Bill, having for its object the expansion of the conditions under "*The Agricultural Bank Act of* 1901" by permitting the trustees to make advances to the owners or occupiers of agricultural land for the purpose of paying off liabilities already existing on their holdings, &c., and thus bring this State's Act into line, to a certain extent, with similar Acts in the other States. Unfortunately, this Bill could not, owing to pressure of other business before the House, be proceeded with, and as the matter is one of very great importance to the agricultural community, I considered it my duty to accept the opportunity offered by this gathering of representatives of the agricultural industry of this State, with the honourable the Minister charged with the affairs pertaining to that important industry at its head, to reopen discussion on the subject, and obtain if possible an expression of the Government's intentions in the matter from our able and distinguished Chairman, and also an expression of opinion from the delegates present.

I will, therefore, preface my remarks by briefly summarising the conditions obtaining in the other States of this fair Commonwealth and New Zealand, and thus enable you to compare these conditions with those in operation in this State :-

STATE ADVANCES TO FARMERS.

South Australia.

Acts.—"*The State Advances Act of* 1895," and Amendment Acts of 1897 and 1901.

Funds.—*How raised*: By the sale of mortgage bonds by the State Bank, guaranteed by the Government. *How operated*: By a State Bank, managed by a Board consisting of five Trustees and a General Inspector appointed by the Governor.

Advances.—*To whom made*: (*a*) To farmers and other producers, and in aid of industries proclaimed as "rural industries"; (*b*) to Local Authorities. Farmers and other producers includes farmers, graziers, and persons engaged in agricultural and pastoral pursuits. Rural industries includes the freezing of meat for export, the manufacture of wine, dairy produce, or any other industry which may be proclaimed a "rural industry." *For what purpose*: (*a*) To farmers and other producers as defined; (*b*) to Local Authorities, for the purpose of purchasing or otherwise acquiring bridges, wharves, roads, or other permanent improvements and for the redemption or conversion of existing loans. *For what term*: For seven years upwards to forty-two years. *For what amount*: To farmers and other producers, and in aid of industries—(*a*) On Freehold: To the extent of three-fifths of the unimproved value of the land and the permanent improvements thereon, *plus* one-third of the value of any cultivation, such as a vineyard or orchard; the last assessment of the unimproved value of the land by the Commissioner for Taxes not to be exceeded in the valuation for the advance; (*b*) On Crown Leasehold: To the extent of a sum not exceeding half of the selling value of such lease, including the interest of the holder in any permanent improvements on the land. No advance to one company or person to exceed £5,000.

To Local Authorities: The advance shall not exceed the cost of any works to be constructed or acquired, or the amount of the loan to be redeemed or converted, or such sum as an annual rate of 6d. in the £ on the assessed annual value of the rateable property of such Local Authority. *Security required*: By Farmers and Other Producers: A mortgage over the land and bill of sale over the buildings, &c., &c. By Local Authorities: The security of their rates. *How paid*: By bonds, or otherwise, at the option of the Bank. *How repaid*: In half-yearly instalments of principle and interest on the 1st April and 1st October each year, either in cash or by Bank's bonds. Each advance carrying interest not exceeding 5 per cent. per annum.

Western Australia.

Acts.—"*The Agricultural Bank Act of* 1894," and the Amendment Act of 1896.

Funds.—*How raised*: By sale of Government bonds bearing interest at 5 per cent per annum, payable half-yearly. *How operated*: By the Agricultural Bank, under a manager appointed by the Governor.

Advances.—*To whom made*: To farmers or other cultivators of the soil. *For what purpose*: For making improvements on unimproved holdings, or adding to improvements already made. Improvements includes clearing, cultivating, ring-barking, fencing, draining, wells, reservoirs, buildings, or other improvements, which in the opinion of the bank manager increase the agricultural or pastoral capabilities of the land. *For what term*: Thirty years. *For what amount*: Not exceeding three-fourths of the fair value of the improvements proposed to be made. No one person to obtain an advance or advances exceeding £800. Interest at the rate of 6 per cent. per annum to be paid thereon in half-yearly payments. *Security required*: Deed or instrument of mortgage over freehold, or special occupation lease, conditional purchase, and homestead farms. Advances to be made on first mortgage only, but security in addition to the land to be advanced upon may be accepted. *How paid*: In cash, either in one sum or in instalments, as the improvements proceed. *How repaid*: In half-yearly instalments equal to one-fiftieth part of the advance, such repayments to commence five years after the date of the advance.

New South Wales.

Acts.—"*The Advances to Settlers' Act of* 1899."

Funds.—*How raised*: By sale by the Treasurer of Government stock, bearing interest at the rate of $3\frac{1}{2}$ per cent. per annum. *How operated*: By a Board of three members appointed by the Governor, such Board being attached to the Department of the Secretary for Lands.

Advances.—*To whom made*: Holders of freehold land or Crown lease, including mortgagors. *For what purpose*: For the relief of settlers financially embarrassed owing to the recent droughts. *For what term*: Ten years. *For what amount*: No advance shall exceed £200. *Security required*: Mortgage, charge, or other security to be prescribed by regulation. Advances on mortgaged property only to be made with the consent of the mortgagee. *How paid*: In cash. *How repaid*: The Act leaves it to the Board to decide.

Victoria.

Acts.—"*The Savings Bank Act of* 1890;" Amendment Act of 1896, Divisions 3 and 4.

Funds.—*How raised*: By sale of bonds by the Commissioners of the Savings Bank, guaranteed by the Government, and bearing interest at the rate of $3\frac{1}{2}$ per cent. per annum, payable half-yearly. *How operated*: By the Commissioners of the Savings Bank.

Advances.—*To whom made*: Farmers, graziers, market gardeners, or persons employed in agricultural, horticultural, or pastoral pursuits. *For what purpose*: To assist in paying off liabilities already existing on the land to be secured. To pay off money owing to the Crown in respect of such land. To make improvements or to develop the resources of the land by carrying on agricultural, horticultural, viticultural, or pastoral pursuits on such land. *For what amount*: On Freehold—To the extent of two-thirds of the actual value of the land at the time of the advance. On Crown Leasehold—Two-thirds the actual value of the land, less the amount of rent payable before a grant can be obtained for the land, together with an additional advance not exceeding 15s. per acre on each acre having an improved value of over £2. Vineyards, hop grounds, orchards, and fruit-growing plantations may receive an increased "special" advance beyond the two-thirds value of the land up to £30 per acre. No advance shall be made for a smaller sum than £50 or larger than £2,000. Applications for advances under £500 to have priority. *Security required*: Deed or instrument of mortgage. Only first mortgage to be accepted for advance. *How paid*: By bonds or in cash. *How repaid*: By sixty-three half-yearly payments of principal and interest. Interest at the rate of $4\frac{1}{2}$ per cent. per annum, and total repayment must not be at a less rate than 6 per cent. per annum.

New Zealand.

Acts.—"*The Government Advances to Settlers Act of* 1894," and Amendment Acts of 1895, 1896, 1898, 1899, and 1901.

Funds.—*How raised*: By issue of debentures or scrip or inscribed Government stock, or otherwise, such bonds being guaranteed by the Government, and carrying interest at the rate of 4 per cent. per annum. Authorised limit of loans, £4,000,000. *How operated*: By a General Board, consisting of the Colonial Treasurer, or in his absence the Minister for Lands or other Minister, the Superintendent, Public Trustee, Commissioner of Taxes (*ex officio*), and one person outside the Civil Service, assisted by District Boards of three Government officers or other fit persons appointed by the Governor.

Advances.—*To whom made*: To (*a*) Freeholders of urban, suburban, and country lands; (*b*) Crown leaseholders of country lands. *For what purpose*: (*a*) On Country Lands - For such relief to settlers financially burdened as is consistent with the public safety. (*b*) On Urban and Suburban Lands—For the erection of buildings on unimproved lands and on improved lands. *For what amount*: Under the Instalment System. (*a*) On Freehold—To the extent of three-fifths of the value of the security; (*b*) On Leasehold—To the extent of half the value of the lessee's interest in the lease. Under Fixed Loan System—Not exceeding half value of security. No advance or advances to one individual to exceed £3,000. *For what term*: (*a*) Under Instalment System—Thirty-six and a-half years; (*b*) Under Fixed Loan System—Not exceeding ten years. *Security required*: Mortgage over the land. Only first mortgage to be accepted. *How paid*: Presumably in cash. The Act is silent on this point. *How repaid*: Under Instalment System—In seventy-three half-yearly instalments of principal and interest at the rate of at least 6 per cent. per annum of the sum advanced. Under Fixed Loan System—At end of term. Interest at the rate of 5 per cent. per annum payable half-yearly.

Queensland.

Acts.—"*The Agricultural Bank Act of* 1901."

Funds.—*How raised*: By issue of debentures or by an appropriation by Parliament up to £250,000 in the whole. Such debentures, secured upon the consolidated revenue, shall bear interest payable half-yearly at a rate not exceeding 4 per cent. per annum. *How operated*: By three trustees and a manager appointed by the Governor.

Advances.—*To whom made*: The owners or occupiers of freehold or Crown leasehold. *For what purpose*: Making prescribed improvements—viz., clearing, &c. (*See* Regulations.) *For what term*: Twenty-five years. *For what amount*: 13s. in £1 of the estimated value of the proposed improvements. No person to receive advances totalling more than £800. *Security required*: First mortgage. *How paid*: By cash, either in one sum on completion of improvements or in instalments as the improvements proceed. *How repaid*: During first five years only interest at the rate of 5 per cent. per annum is payable, the advance then being redeemed in twenty years by half-yearly payments of £4 0s. 3d. per £100.

Mr. Fox's Amendment Bill of 1902.

Title.—The Agricultural Bank Act Amendment Act of 1902.

Advances.—*For what purpose*: For the purchase of stock, implements, or machinery, or for the discharge or release of any mortgage or encumbrance or other debt due by such owner or occupier, or for such other purpose in connection with such holding as may be prescribed. *For what term*: Not to exceed thirty-seven years nor be less than seven—within these limitations term to be fixed by trustees. *For what amount*: At a rate not exceeding 12s. in the £1 of value of security. *How repaid*: By half-yearly instalments bearing interest at 5 cent. per annum.

NOTES AND COMMENTS.

By the Bill introduced last session it was attempted to widen the scope of the existing Act and briefly to permit the trustees to extend their operations to those "who have borne the heat and burden of the day," the pioneer settlers, who, owing to adverse seasons and other causes have been forced to borrow—in some cases at ruinous rates of interest—the necessary capital to enable them to retain possession of their holdings, by making advances at a rate not exceeding 12s. in the £1 of the fair value of the security offered for a period not exceeding thirty-seven nor less than seven years to enable them to redeem the existing loans on their land and make a fresh start under favourable conditions. When the present Act was before Parliament in 1900 and 1901, nearly every representative of farming communities pressed for an extension of the system in the direction indicated by the Bill introduced by me last year, the measure being only allowed to pass into law in its present form on the principle that "half a loaf is better than no bread."

The existing Act substantially follows the Western Australian Acts in so far as it is for the purpose of making advances only on proposed improvements. The machinery, however, differs considerably, as is only natural; but it is doubtful whether the Western Australian system of management by a manager, directly responsible to the Minister is not preferable to that adopted by this State—*i.e.*, management by three trustees. The system of inspection of improvements and consequent progress payments in Western Australia—which has, it is reported, worked in a highly satisfactory manner—seems worthy of consideration of our trustees in view of the possible expense and delay incurred by the system of inspection by the Bank's inspectors provided for under our Act. It is as follows:—

Each applicant is supplied with improvement certificates when an approval of his loan is sent to him. He must, before any progress payment is made, obtain a certificate from some reliable landholder of good repute, who shall be approved by the Bank, as to the value of the improvements effected, payment of the proportion value due following upon receipt of such certificate if accepted by the manager. By this system the Bank is put to no expense, as would be the case if it was necessary to provide inspectors to report on improvements in progress.

In his report for the year ended 31st December, 1901, issued in March last year—the latest report I have up to the present been able to obtain—the manager of the Western Australian Bank says, *inter alia*—

"That the general business is steadily growing. The impression seems generally to be widening that the time has come for the extension of the Bank's operations. That there is room for such an extension scarcely requires to be argued, while the practice of State advances to settlers in the other portion of Australia is receiving such widespread approbation that evidently the principle has come to stay.

"With the observance of ordinary prudential rules there is no doubt the functions of the institution might well be expanded to bring it into line with the New Zealand, South Australian, and Victorian systems."

It may be mentioned that since the establishment of this bank, in 1894, up to 31st December, 1901, £145,650 has been approved for advance, the amount on the Bank's books on 31st December, 1901, being £128,847 10s.; the improvements effected, in course of completion, and proposed, are valued at £274,430, and consist of the following:—

Clearing	73,704 acres.
Cultivating	57,638 do.
Ringbarking...	72,052 do.
Fencing	34,299 chains.
Drainage, valued at £1,365.	
Water supply, do. £7,648.	
Buildings, do. £19,136.	

The manager's remarks as to the expansion of the bank's operations resulted in the introduction of a Bill in the Legislative Council by the Minister for Lands (Hon. Adam Jameson) with the object of amending the Act of 1894 by extending the purposes for which advances may be made, by permitting the manager, with the approval of the Governor, to make advances on the security of improved holdings to farmers and other cultivators of the soil to enable them—

1. To pay off liabilities already existing on their holdings.
2. To carry on farming, agricultural, horticultural, or viticultural pursuits on their holdings.
3. To add to the improvements already made on their holdings.

The amount of such advances is limited to half the estimated value of the land and improvements made and proposed to be made thereon. Any one person being limited to an advance or advances not exceeding £1,200. Applications for advances under £500 to have priority. In the case of advances on leasehold the half value is reducible by the amount of rent required to be paid to make the land freehold.

The Bill also provides for the increase of the sum to be raised under the Acts to £300,000.

This action in Western Australia, whose system we have practically adopted, is a very strong argument to my mind in favour of the early expansion of the purposes of the Act in this State, and more than justifies, if a justification was necessary, my endeavours last year in a similar direction.

The South Australian system seems to savour too much of the State Bank pure and simple, and, although no doubt successful, is too big an undertaking to adopt or follow in this State in the present crippled condition of our finances. This remark applies largely to the New Zealand system, the advances made in that country on urban and suburban lands for building purposes, although with careful management, perhaps, remunerative, do not, to my way of thinking, come within the range of the general objects of this Act—viz.: the promotion and improvement of settlement on our agricultural lands. In fact, it would be a distinct attack upon the business of our large building societies, and in that way is objectionable, being a direct interference with private enterprise. To give some idea of the extent of the operations under the New Zealand system, I will quote the following figures taken from the annual report for the year ended 31st March, 1902:—

Applications received since inception ...	14,746 ...	£5,204,300
Advances authorised	11,312 ...	3,736,620
On books at that date	9,862 ...	3,073,685
Value of security at that date	... ...	6,737,611

This report says instalments continue to be met by mortgagors as satisfactorily as in previous years.

The 1 per cent. sinking fund in the hands of the public trustee amounts to £95,954 7s. 5d., and the sum to the credit of assurance fund to £43,872 9s. 6d.

I have given as much information on the various Acts dealing with State advances to farmers and others as my time will permit, and, so far as the reports to hand and inquiries go, they are all more or less a financial success, as I think I have shown. However much we may agree or disagree about encouraging people to lean on the State—and, personally, I am an unbeliever—believing as I do that self-reliance is a first principle either in the prosperity of a nation or an individual. But as this State, in 1901, thought fit to introduce this system, when the present Minister for Agriculture succeeded in passing the existing Act, which, as previously remarked, was accepted only as "half a loaf," confining, as it does, its assistance to future improvements, it was with considerable pleasure last session that I heard the Minister state in the House that he considered that the scope of the Act should be widened in the direction indicated by the Bill I had the honour to introduce, and I, and a very large section of the House, will be prepared to heartily support such a Bill should the Government accept and introduce it during the coming session.

The transactions of this State's Bank to date are as follows:—

	£	s.	d.
Total number of applications received, 263 for	35,362	7	8
Total number of applications approved, 183 (11 withdrawn) for	24,220	10	0
Total number declined and withdrawn, 45.			
Total number under consideration, 35.			

This is practically the result of over a year's operations of an Act which permits the raising of a sum of £250,000 for the purpose of advances, and when it is considered that the advances are made on all classes of unencumbered agricultural land, freehold, and Crown leasehold, I think you will agree with me when I state that it is evident the conditions under the Act require to be liberalised so as to permit our pioneer farmers, wheat-growers, dairymen, and others, who have suffered severely during the past series of drought seasons, taking advantage of this means to overcome their present crippled condition, and to enable them and the State generally to reap the reward which is justly their due. I commend this matter to the earnest and sympathetic consideration of the Minister, and will conclude this brief paper by expressing the hope that the Government will undertake to introduce an Amendment Bill this coming session on the lines herein indicated as desirable, failing which I intend to ask leave to introduce a Bill myself so soon as the House meets.

DISCUSSION.

Mr. C. P. Mau (Mackay): It gives me the greatest pleasure in the world to be able to note that such a man as Mr. Fox has taken up this subject. Last year, at Toowoomba, I had the same subject for discussion, and we may reasonably assume that something good will come out of the matter when Mr. Fox has so earnestly taken it up. If this Bill of Mr. Fox's is passed, it will give innumerable farmers of the State a new lease of life. There is very little for me to criticise in the paper, because I can honestly say that there is nothing in it which it is possible for anyone to pick to pieces. I hope that everyone in the room will come up, state his opinion, and throw as much weight as possible into the scale to show that we are in earnest that the pioneers of the country should receive some consideration from the Government of the day. It has been pointed out that the present Agricultural Bank has not so far done a great deal of work. I might say that in my district applications have been made for advances to the Bank, and it has been found that very little can be got out of it. An application was made under the present Act for an advance, the security was accepted, and assistance was promised. Now, when a man has got good security to offer for his assistance, he thinks he ought to get the grant. But I find on inquiry that not only have the improvements you are to put on the land to be specified (which is quite right), but that you have to complete them before you get the money. Now, a man generally has to employ labour to carry out improvements, but if you have any fault to find with the men you have engaged, you are unable to pay them off, because you cannot get any money from the Bank till the work is finished. Again, you cannot effect improvements without rations and tools, which means that you have to humble yourself to the storekeeper for credit, and pay more than the market value for the goods you are buying, which means an addition to the amount that you are paying for your accommodation. There is a great deal of hardship in connection with getting an advance from the Agricultural Bank, and I am glad to see that Mr. Fox has taken into consideration its amendment. Everything that is wanted is embraced in the paper. Mr. Fox has pointed out what has been done in the other States, and I can assure you that it is not only in Australia that the system is in operation. The system was in operation when I left Denmark, and you all know that Denmark is one of the most prosperous of agricultural countries. That very system of advancing cheap money to farmers has put them on their legs. Every man there is independent in a certain way. The system has done so much good for other countries all round that one can hardly be accused of over-confidence in thinking that it will do some good here. If we put our shoulders to the wheel and ask, and ask, and ask, we shall get it, and find the benefit of it. I hope every gentleman here will give his opinion; and if the majority of the people here are not in favour of it, then we shall not get it. You should testify now to the effect, whether or not it is advisable for the Government to introduce a measure to advance money to farmers to redeem their present liabilities. It will simply mean the taking off of a millstone that has been hanging round the necks of hundreds of our farmers. If this Bill comes into existence, it means that farmers will have thirty-seven years to refund their loans. We only want to redeem the people who have got security, for we do not wish that the Government should do other than sound financial business, but we want the Government to help us so that we can help ourselves.

Mr. N. L. Rosenlund (Booyal): It gives me great pleasure to support the proposals contained in the paper just read, for I think it is the duty of every person to support the bringing in of a measure which tends to keep on the soil the pioneers who have, through drought and other causes, been compelled to involve their holdings. Many are so situated that if they improve their properties they do not know when the mortgagees may come round and drive them out. Long terms will give more confidence, and put fresh heart into those who have mortgages hanging over them. The prosperity of scores of farmers in every agricultural district in Queensland depends, I think, upon an amendment of the present Agricultural Bank Act, and the question is a more serious one than many perhaps consider. Our present Act is a step in the right direction, but its provisions want extending. There are three good men at the head of the institution, and there is no reason why its scope should not be widened.

Mr. G. N. Terry stated that, although he was personally opposed to borrowing, he had been desired by the Stanwell United District Farmers'

Union to support Mr. Fox's Bill, and he had accordingly much pleasure in doing so.

Mr. H. A. Tardent (Toowoomba): The commercial community wants credit as well as the agricultural, but the difference is that, while short credit suffices the former, the latter wants long credit In Australia we have banking institutions which meet the case of the commercial man, but we have no institution that meets the case of the farmer. Hence the necessity for agricultural banks. There have been times when the farmer has been at the mercy of money-lenders; but everywhere where the State has stepped in and organised agricultural credit, agriculture has made immense strides.

Mr. W. Fielding, of Redland Bay, suggested the institution by the Government of village banks. These were very inexpensive to run, and the business done by them was thoroughly sound, because the local directors always knew to a penny the value of the land upon which advances were desired.

Mr. E. Adams, of Rockhampton, stated that he was entirely in favour of Mr. Fox's Bill.

Mr. F. W. Peek (Chamber of Agriculture): I have been charged with being an opponent of the Agricultural Bank scheme. What I originally wanted was a co-operative bank, but, although I have been converted from that, I am of opinion that the Queensland Agricultural Bank, as at present administered, is of no use to the State. It does not touch the small farmer as it should. At the last Conference Mr. Mau kindly referred to the old settlers who have borne the heat and burden of the day and yet were unable to come within the scope of the Act. There was a great deal of truth in that, and we know that the Government has been practically giving assistance which should have been taken up by the Bank. I have much pleasure in supporting Mr. Fox in his energetic endeavours to give men on the land immediate relief.

Mr. G. Simcocks (Stanthorpe), in reply to those who had criticised the administration of the present Agricultural Bank, instanced a case where the institution had been of material assistance to an orchardist in the Ballandean district.

Mr. R. Beiers, of Childers, heartily endorsed the action of Mr. Fox in bringing forward his measure. He did not say the present Bank was a failure, but from cases he knew of in the Isis Scrub he thought it was too long in granting applications.

Mr. J. Mann, of Cairns, expressed his appreciation of Mr. Fox's paper, and trusted its proposals would find their way into the Statutes of the State

Mr. S. L. Jones, of Roma, thought the thanks of the whole of the farming community were due to Mr. Fox for bringing forward the subject. The present Act did nothing for the man who had helped to make the State. That man had gone out and made a place for himself; he had worked hard, but circumstances had driven him into a bit of a corner and he wanted a little assistance. A Bill was brought in to provide for an Agricultural Bank, but it gave that man no relief. On the contrary, it gave assistance to a man who had no interest in the country and helped him to cut the pioneer's throat. As at present constituted, Mr. Jones thought the Act was really doing harm to the country. In fact, it was an encouragement to plenty of men to throw up their present holdings and start afresh.

Mr. W. Beale (Childers) contributed an interesting and thoughtful speech to the discussion.

Mr. G. Fox, M.L.A.: The object of the Bill is to help the foundation of the colony—that is, the people whom we say are the foundation of the colony—the men on the land. I make it a study to go for the men on the land every time. I have studied the question, and therefore claim to know something about it. The object of the Bill is to relieve the struggling man from the Shylocks of the world, and there are more kinds of Shylocks than one. Some storekeepers are splendid fellows, but there are others who charge large percentages for accommodation. A farmer is tied and cannot help himself, and hence my wish for legislation to relieve him. I do not consider the business the Government is doing at the present time under the Act good business, and I want to see good business introduced. Not that I wish to withdraw any help to the man who is on the land, because what I desire is to help him so that the revenues from our railways may be increased, if nothing more is accomplished. What I wish to do is to help a certain class who, in justice, should not have been left out of the Bill in the first instance.

A motion by Mr. MAU, seconded by Mr. TARDENT, that the Conference endorse the action of Mr. Fox in bringing forward the Bill, was referred to the Resolutions Committee.

SEVENTH SESSION.

WEDNESDAY, 8TH JULY, 1903, 7·30 P.M.

The first paper was by Mr. W. R. Robinson, of the Royal Agricultural Society of Queensland, Toowoomba. In the absence of Mr. Robinson it was read by the CHAIRMAN—

ANGORAS FOR QUEENSLAND.

[By W. R. ROBINSON, Toowoomba.]

As many of you are well aware, I have always taken a great interest in the improvement and importation of stock of all sorts suitable to this State, notably horses, dairy cattle, and swine, and at the various conferences held under the auspices of our worthy Department of Agriculture I have read papers; but, on this occasion, I purpose introducing a fresh line, and one which I feel confident must, in the near future, play a very important part, and that is the introduction of Angora goats. Several Southern gentlemen have already started small flocks, and, by what I can learn, they are doing very well with them. I cannot say I have had any experience in goat-raising, but, from information received and what I have read about them, they appear to be an animal very suited to a large area of country now practically lying waste. I refer to country on the Main Range—undergrowth land, semi-scrub country, and land unsuited for either sheep or cattle, and a class of country that can be obtained for very small capital.

I am free to admit that one or two breeders on the Darling Downs introduced a few Angoras some years ago, but at that time little was known about them, and the open Downs plains were not suited to their habits or to the production of good mohair. There is abundance of land in all parts of this State well suited for raising Angoras, and there is no reason why the mohair industry should not be developed here, as in South Africa and elsewhere. Indeed, there are many reasons why Angora goat-breeding and the production of mohair should add to our wealth. Mohair and goat-skins have a world's market, and are as marketable as all other farm productions; there is a growing demand for them, and they can be sold either locally or in the home markets. The outlay in starting a small flock would not be very great. Angoras are hardy, prolific, and, by judicious crossing and grading, a pure flock could very soon be built up.

MEAT OF GOATS.—Quoting from "Dalgety's Review"—"The only part of the Angora goat that is not at present in actual demand in large quantities, locally or for the world's markets, is the flesh, not because the meat is not nutritious or delicious, especially when young, but simply because it has not yet found its way wholesale into the meat markets. A plentiful supply of meat should popularise it and bring it into general use. Even if this were not so, the raising of Angora goats for mohair and skins should be sufficiently profitable, where conditions are peculiarly favourable, in the Commonwealth. The 'gamey' flavour of the meat is due to the goat being more a browser than a grazer, and it is that characteristic that recommends the Angora for country not specially adapted for sheep, cattle, or horses."

HOW TO RAISE A FLOCK.—If funds permit, of course it would be best to start with pure stock on both sides—the progeny would be valuable and the mohair of the best quality; but if funds are limited the best method would be to obtain a pure buck from some noted and reliable breeder, and cross him with common pure white nannies, which are fairly plentiful and can be bought at very low prices. Select those showing fine heads and horns, and smooth, silky skins; avoid all nannies showing long, coarse hair. Cull heavily the first year, only retain the weaner does showing most of the Angora type. On these use another pure Angora buck, and so on until the fourth cross; you then have a first-class goat, which will produce first-class mohair yielding an average quality fleece of from 4 lb. to 6 lb., the better animals yielding up to 8 lb. They are hardy, easily managed, and will live where a sheep or bullock will starve; they are free from disease, will live on poorer country and are less trouble than sheep. They should be shorn in the early spring; if left later, the hair loses lustre, life, and weight. The export of mohair from the Cape in 1899 amounted in value to £640,000; the average price per lb. being 1s. 4d. to 1s. 7d.

Country suitable to goats would take 3 acres or even more to carry a sheep, which, at the outside, would only yield, say, 6 lb. of wool at 8d.—4s. Three goats on the same country would yield 5 lb. of hair each at, say, 1s. per lb., or equal to 15s., and with far less trouble in management. The term of an Angora's life is about eight to ten years, but it matures at from eighteen months to two years, at which period the does are fit to breed. Kids and weaners produce the finest quality of hair, and the wethers produce heavier fleeces than the does.

The possibilities of this important industry are immense, and worthy of serious consideration; and I think our Agricultural Department would do well to start a small pure-bred flock, so that intending purchasers could obtain their stock from a reliable source.

There are practically millions of acres of poor, rough land that under this industry would prove a valuable asset to the State.

The demand for Angoras is rapidly increasing, and information regarding them is being anxiously sought after. Only during the past few weeks I have had several letters from gentlemen who are thinking of launching on this important industry. I have been in communication with some of the leading breeders, and find bucks can be purchased at from £3 3s. to £5 5s. each; so if any gentleman present wishes to start a flock I shall be pleased to give him the address of a good and reliable breeder.

In considering Angora culture it is of more importance to study the climate with reference to moisture rather than temperature. Therefore, low lands with much moisture and high temperature are not recommended. So far as temperature is concerned, no place has been found that is too hot or too cold for Angoras, for although not partial to heat they will stand it quite as well as sheep. The climate in Angora, Asia Minor, where the breed originated, and is still supposed to flourish in its more perfect state, is extreme; 85 degrees Fahrenheit are registered in summer, and as low as zero Fahrenheit in the winter. At the Cape, where they are thriving well, the temperature goes higher in summer, but not so low in winter. The United States presents a wider range. Queensland, therefore, as far as temperature is concerned, should be everything that can be desired. While the sale of skins and mohair provides direct cash returns, the land on which Angoras are depastured can be permanently cleared of undergrowth at a cash profit instead of having to employ labour to do the work, which is not as effectually cleared as by the goats. The improvement of second-class country through the agency of goats will no doubt be an inducement with many to embark in the business. The Angora being essentially a browser will stand more hardship in time of drought than any other animal. It is a well-known and noticeable fact that through the last trying drought the flocks of common goats looked wonderfully well and bright, although there was not a vestige of grass to be seen.

I feel confident that the mohair industry in this State must in the near future be a profitable one and well worthy more than mere passing attention. We have the country and climate suited for its development, and I hope ere long to see some of our dairy farmers and others take up the business. There is money in it, and good money.

DISCUSSION.

Mr. Deacon (Allora): The late Mr. Charles Clark, of Talgai, bred a lot of goats. He did not import more than two or three animals, yet in time he managed to develop a fairly large flock of practically pure-bred Angoras. They were very pretty animals. They were gentlemanly goats. Their hair was very soft and clean, and why he finally gave them up I do not know, because he was a great enthusiast on the subject. I disagree with Mr. Robinson in what he says with regard to the open downs not being suitable for goats. The goat is like any other animal. If it gets poor food it puts up with it, but it is no use saying it will not do on the rich lands of the Downs. At any rate, those goats of Mr. Clark used to do very well, and he believed that Angora breeding was an industry that would pay well.

Mr. E. ADAMS (Rockhampton): They are doing splendidly in our district, but we cannot get any reliable information as to the value of the hair. There is one thing we shall have to consider before we do anything in connection with goats, and that is the question of dingoes. The dingoes are so numerous now that they are killing not only goats and calves, but two-year-old cattle. Before we have goats we must have a decrease in the dingoes. I would like to suggest that it be made possible for marsupial boards to give bonuses for dingo scalps as well as for marsupial. As to the prices quoted by Mr. Robinson, if he can recommend me to anybody who will give me a good Angora for £3 3s. I shall give him an order at once. I do not altogether think Mr. Deacon is correct in his opinion that goats would like rich grass country. I have had any amount of grass in a paddock with goats in it, but have found that they would always go for the trees in preference to the grass. I think the country most suitable for the goat would be ridgy land.

Mr. H. A. TARDENT (Toowoomba) was convinced that the Angora goat would succeed in a large part of Queensland, especially in the West.

Mr. G. N. TERRY (Stanwell): Along the Central railway you will find plenty of flocks of goats. They are not Angoras, although they have a strain of the Angora in them. During the time of the drought, when sheep were coming in from the West, you could hardly go 20 yards along the road without meeting a dead sheep, and at the same time at every lengthsmen's camp you passed you would see from 100 to 200 goats in splendid health. There was an article in the *Agricultural Journal* some time ago, which was well worth reading, and which would bear reproduction. In it, it was stated how you could protect a goat. I have never seen the idea tried, but think it would be worth it. The suggestion in the article was to procure a pup of some good breed of cattle dog, kill a kid as soon as one of your goats had kidded suitable to the time you got the pup, and teach the puppy to drink the goat's milk from the teats. By that means the puppy is brought up among the goats, and would follow them wherever they went. When the pup reached dog's estate it would still stay with the flock, and protect it from the dingoes and anything else that came along in its way.

Mr. F. W. PEEK (Chamber of Agriculture), after directing attention to the valuable and succulent qualities of the flesh of the goat, stated that the National Association had for the first time in their schedule included Angora goats in the prize list for the forthcoming Brisbane Exhibition.

The CHAIRMAN: I consider Mr. Robinson's paper a very valuable and interesting one. He does not say that he speaks from his own knowledge when he says that he thinks goats would not do so well on the downs country as they would on inferior land. He believes, however, that where the ground is moist the goat would not do so well as he does in drier country; and undoubtedly the goat shows a preference for mountains. While there is a large amount of country in the State which is not adapted for either sheep or cattle, Mr. Robinson says, very truthfully, that this same country would probably be admirably adapted for goats; and if the goats will thrive on such country, is it not better to raise them than to allow the land to produce nothing? That is the point that Mr. Robinson desires to make. With regard to the objection that dingoes will attack the goats, an objection which has been very well met by Mr. Terry, I am inclined to think that the dingoes are as much liable to danger from the goats as the goats from the dingoes. Whatever the danger may be, I should certainly say it is a matter for speculation. But it must be a great deal less than the danger which sheep have to risk. It is quite true that the dingoes at the present time in this State are a more serious menace to our stock, whether that stock be sheep or cattle, than they have ever been before. I do not attribute it entirely to the drought, but to the fact that the native dogs in many parts of the country have been crossed by a fierce strain of other dogs; and whereas the original dingo was a mild and rather cowardly animal, there are now some dingoes in Queensland which have apparently a strain of the boar hound in them, and which are really as dangerous as I should imagine a wolf was. So the question of the dingo is one which is very serious to all persons who have got sheep, and I know that, in addition to the bonuses which are offered for the destruction of dingoes by boards, pastoralists frequently supplement the bonus by the offer of £5, or even £10, for the destruction of one particular dingo. Whatever the price of mohair is at the present time, I think it is probable that the price of this commodity is one that will rise and fall, and that it will rise and fall with the fashion. If mohair happens to be in demand, I presume the price will go up, and that, if the demand slackens in favour of something else, then the price will decline. It should be very easy to ascertain the price of mohair at the present time, and I have no doubt Mr McLean will make inquiries and have the information published in the *Agricultural Journal*. The first time I heard Mr. Terry's anecdote, it was not told of goats, but of a device that was resorted to in Mexico to protect sheep. Judging, however, from the goats I have seen, they do not want a protector very much. There is another matter to which I wish to direct your attention, feeling as I do that the experiment is worth making. It would be impracticable for some time to come to get very large flocks of pure-bred Angoras. You would have to breed them for about four or five generations before you could call them pure-bred. What people, I suppose, would do, would be to cross the ordinary goat with an Angora buck. Then you would have the half-bred. You would go on breeding with the pure Angora buck until you perhaps got so far as an octoroon Angora, but the trouble would be where would the common variety of goat end, for the law is (I know it applies to municipalities), if a goat is found wandering about without protection, a man can take a lethal weapon and destroy it. That is the law as affecting common goats, and the difficulty would come in with the half-bred animal. This question of the protection of the cross-bred goat, and as a matter of fact we could not expect to get any other, is the only difficulty that I see in connection with this subject.

The next paper was Mr. DEAN, and was as follows:—

BULLS FOR DAIRYING PURPOSES.

[By J. EDGAR DEAN, Woodlands, Maryborough.]

Be thou diligent to know the state of thy flocks, and look well to thy herds.—PROVERBS xxvii., 23.

This advice of King Solomon's, like all other advice contained within the pages of the Word of God, is well worthy of our most serious consideration.

I venture to say that never in the history of the dairying industry in Queensland has there been a more opportune time than the present for us to "look well" to the state of our herds. The butter and bacon factories have provided us with sure markets for our cream and pigs.

But, alas! we are short of cattle. Loss after loss has swooped down upon us: the ticks, Texas fever with its too often fatal termination—redwater, and then the most disastrous drought we have ever known. And now, when we have received some measure of relief through the good rains which have fallen, a fresh outbreak of Texas fever comes along to single out fresh victims which had escaped the first visitation.

Having looked upon the devastation and loss brought upon us from the above causes, there only remains one course open to us—to go forward. Solomon says: "Be thou diligent to know the *state* of thy flocks." Let us consider. Are they up to the mark? Will they give us the return for our labour which they ought to do? Are we keeping cows or are the cows keeping us? If they are keeping us, is there not still room for improvement?

The drought has taught us that we must make provision for feeding during times of scarcity. We cannot afford to feed bad cows. A cow making 1 lb. of butter weekly will consume as much food as another one making 1 lb. of butter daily. We have been too prone to estimate our stocks according to number rather than to the individual value of each cow. The lessons we have been taught lately have shown us the necessity for carrying on our dairying operations *intensively* rather than *extensively*.

As we look upon the remnant of our depleted herds, we are aware that we must set to work and build them up again, either by purchase or breeding. The latter course will be that more generally followed, and I wish to impress upon my fellow dairymen the great necessity of breeding profitable stock—stock which will pay us to "look well" after. There is no better way of doing this than by selecting good sires.

I am afraid we do not realise the importance of putting our cows to good bulls. I reckon the bull is three parts of the future herd, and, for the benefit of those who disbelieve this statement, I will instance a case or two which came under my notice. I bought a cow which, during the four seasons I owned her, never exceeded 8 quarts of milk per day. The cow was put to a common-bred bull, the result being a heifer calf which, as a cow, gave a milk yield of 7 quarts daily. The second season I put the cow (*a*) to a purebred bull, and the result was a heifer which, during her first season, gave 13 quarts of milk daily. I bought a cow which gave 12 quarts of milk daily. This milk made about 5 lb. of butter per week. She had a calf by a Jersey sire, which, as a cow, gave 9 quarts of milk daily, from which I made 7 lb. of butter per week.

These are only two instances out of many which have come under my own observation. In each case all the animals received the same treatment.

I am fully aware that there are many of our good dairymen who are alive to the importance of good stock, the fact of their having bought good bulls proves this; but there are many other dairymen whose herds are small, or who are not able to pay the price for a bull of the class they want. Numbers of good bulls have died from fever (they being often the first to go), and there is a great danger of very common bulls being used in their place. It is to supply this want that I have written this paper, to suggest a scheme whereby we may introduce into every dairying district a number of purebred bulls of a suitable kind.

We will suppose that a good bull is placed amongst a group of dairy farms, and six dairymen undertake to bring 8 cows each for service during the year, and pay 5s. per cow, equal to £2 each, or £12 for the 48 cows, giving a total of £36 for the three years' service. This is making no allowance for the keep of the bull, as I think a seventh dairyman would be found who would keep him for his services to his own herd. If the cost of the bull were £30, and reckoning three years' interest at 5 per cent. = £4 10s., a total of £34 10s., this would leave a credit balance of £1 10s. The bull could be transferred to another group for three years more, and, as it was paid for during the first three years, the amount of money received afterwards would be clear profit. Allowing the man who had charge of the bull to put 8 cows to him, we would have a total of 56 cows per year, not an unreasonable number. Some breeders allow from 80 to 100 cows to each bull. So if we take ten dairymen with 8 cows each, or eight with 10 cows each, equal to 80 cows at 5s. each, we have £20 per year, or £60 for the three years. It would not matter if the number of cows supplied by each dairyman were unequal if the aggregate were sufficient.

The next point to consider is: Who has to find the bulls in the first case? One way would be for a number of dairymen to co-operate; or a farmers' association, perhaps an agricultural society, might think it a good way to pay off its debentures, though I believe that the first thought will be for the Department of Agriculture, as breeders of purebred bulls, to supply them.

Personally, I am not in favour of running to the Government for every little thing we may want, as I recognise that nothing can come from the public purse without being first put in by the public. But, in this case, it would be a good investment in a monetary sense and also in an increased production from the dairying industry.

I would point out the greatest danger, to my mind at least—that is, Texas fever. The bulls should be immune, or else introduced whilst quite young, for old bulls would die quickly.

There is one great essential to success in this matter, if good results are to accrue from introducing purebred bulls. They must be from proved dairy families. A pedigree is worth nothing unless there is a proved dairying quality behind it. I have known pedigree cows beaten by common cows; there has been too much breeding for colour and certain points, instead of considering how many gallons of milk a cow will give, or what her butter yield is. What does it matter if a cow is not of the exact size or colour our fancy pictures if she does credit to all the food we give her? In buying a Jersey some time ago for use in my own herd, I decided on the above lines.

From the title of this paper some of the delegates to this Conference may have expected me to say which kinds of bulls are the best for dairy purposes. The question is a very large one, and has to be decided by locality and the requirements of the dairyman himself. I will leave that part of the subject for those better qualified than I am to deal with it.

I have tried in a plain, simple way to explain the position in which numbers of our small dairymen are placed, and I sincerely hope that some practical good may result.

Let us "look well" to the state of our herds, and make the best use of them, the example given us by the Master was "Thou hast been faithful over a few things, I will make thee ruler over many." So the best is in this, as in all other honest labour, to take the advice and "whatsoever thy hand findeth to do, do it with thy might."

DISCUSSION.

Mr. S. L. Jones (Roma): Mr. Dean has pointed out that the sire is the principal thing in a herd, but, as the country has been lately, there are plenty of farmers who are unable to buy good bulls. Now, for myself, I cannot see that there is anything wrong in the Government helping us in whatever possible way they can. It is not the Government who supplies the money, but the people.

The Chairman: Therein lies the trouble.

Mr. Jones: If the pastoral industry is in a bad way, and the gold industry is paying, then I think the latter should help the former. In this instance I should think that the Government or Department should let us have these bulls. There are a lot at the College. I do not think they are much use there.

Mr. P. McLean: They are all sold.

Mr. Jones: But people may not be in a position to buy them. In New South Wales, where dairying is one of the greatest industries, there is a stud farm at Berry, and there are bulls there.

Mr. F. W. Peek: And it has proved a failure.

Mr. Jones: The bulls are let out to the farmers at so much a year. Three or four farmers subscribe together for so many cattle. You have to pay 5s. a cow. The great difficulty with a farmer is that if he buys a bull he cannot keep it in the winter time. The bull is left with the herd, and he does neither himself nor the herd any good. If the bulls were hired out by the Department they would get about £15 from each of them, whereas I suppose when they sell the animals they only get about £10 each for them. I think some arrangement should be made whereby the Department should let the farmers have the use of bulls.

Mr. G. Martin, M.L.A. (Childers): On the Richmond River as soon as a bull calf is dropped it is knocked on the head. It is an old question as to which breed is the best for dairying purposes, and it is one that probably will never be settled, for every man must have his own hobby. If you want to to get any young bulls from the Richmond, you will be able to get them pretty cheap for the reason that I have already stated. I am going over there in about six months' time, and if any gentleman likes to bear the expense of getting some of these bull calves over I shall get half a dozen The dairymen over there allow the men who are working the dairies 5s. for each heifer calf they rear, and it should be about the same for a bull calf. One should, therefore, not cost you more than 10s. with freight. That is all you would have to pay for the beast, which would be of the Illawarra breed. Over there the bull calves go to waste, for they have no use for them. They are a by-product. Of course, if you wanted to get a lot you would have to pay accordingly, but I am satisfied I can get over there very cheap half a dozen bull calves of the best milking strains. In New South Wales the stud bulls supplied by the Government are much sought after, and you cannot put any cow to them. There are so many cows offered for service that the Government are in a position to decline to receive any but well-bred animals.

Mr. E. ADAMS (Rockhampton): I gave a hint last night with respect to a bull for the Central district, but was informed that bulls had been sent out and that no demand had been made for their services. Some of the delegates told me last night that the Government would only receive certain cows for service by these bulls, and perhaps that accounts for the non-use of the bulls by the surrounding dairymen.

The CHAIRMAN: That regulation was withdrawn very shortly after it was made. We found no cows were coming, so we withdrew the regulation.

Mr. ADAMS: When a farmer takes a cow to one of these bulls, I take it he wishes to improve his herd, and, therefore, the cow should be accepted. There is no doubt that Mr. Dean is correct when he says that the bull is the great thing in a herd: the strain of milking seems to follow on the male side. As a practical dairyman, I would like to offer a word of advice to Mr. Dean. He says he bought a cow which gave 12 quarts of milk daily and 5 lb. of butter weekly. I would advise him to separate his milk, for if I had a cow which gave 12 quarts of milk daily I would expect to get 10 lb. of butter a week. It is a common thing with a lot of cows to give that amount.

Mr. H. A. TARDENT (Toowoomba): I am satisfied that some means should be devised between the Government, the agricultural societies, and individual farmers for the procuring of good blood, for it would pay everybody in the present stress. We have heard Mr. Martin say that good bull calves can be obtained in New South Wales for next to nothing, and I think the Queensland Government should form the connecting link between those who want the bull calves and those who have them to dispose of.

Mr. PEEK: You will have to wait for the use of them.

Mr. TARDENT: With regard to the Westbrook bull, which was mentioned last night, I would like to put before the Chairman and the Conference the version of the Westbrook farmers. From what I have heard there is evidently a misunderstanding between the Department and the farmers about the bull. I can see that the Department is under the impression that it put the bull there and that the farmers did not care a button about it. The farmers, however, positively told me that the conditions placed upon the service of the bull made the use of the animal prohibitive. There were, I was told, conditions about the cow, before it could be received for service, having to have attained a certain standard of milk production, and the result was that no farmer had the privilege of sending a cow to the bull.

Mr. McLEAN: That condition was withdrawn almost immediately after the bull was put there.

Mr. TARDENT: The bull was an Ayrshire, and a fine specimen of an animal. I know one man who was rather bitter because he could not send his cows to it.

Mr. McLEAN: The same restriction was placed by the New South Wales Government on the bulls which it had out for service.

Mr. TARDENT: I am telling you what is the complaint of the farmers, and I shall be very glad to have the misunderstanding cleared up. I hope the Resolutions Committee will take the paper into consideration, and try and bring out a workable scheme.

Mr. H. SINCLAIR (Booval): I may say in starting that I am very pleased with the paper, as it deals with a subject which needs the most careful consideration from every dairyman. I have a paper coming on to-morrow on dairying in Queensland, and I have already touched on some of the points which have been touched upon to-night. I was brought up in the middle of one of the chief dairying districts of New South Wales, and there is one point I would like to emphasise; and that is, the mark the bull leaves behind him. You have heard of the famous Illawarra cattle, better known down there as the Major breed. There was a Shorthorn cow imported by Captain Charles, of Kiama, or a Mr. Craig; I am not sure which, but I think it was by Captain Charles. He imported this cow long before I was born. The cow died, but before her death she gave birth to a bull calf. Fortunately for the Illawarra district, and fortunately for Australia, the calf, afterwards to be known as Major Want, was reared up to become the foundation of the Major or Illawarra cattle. We have his progeny to-day throughout the length and breadth of Australia. I saw within the last few days a cow a couple of miles from here, and I am prepared to bet my last dollar that she was a Major cow. They are of Shorthorn origin, but we call them the Major or Illawarra cattle. I thought to-day of the difficulties of the Department in placing bulls out for service by the public, and of the apparent non-success of their ventures. We must not look for success immediately, but wait, for it will come later on. The Department may feel discouraged, and I should say they would feel discouraged, if they let their bulls out on the terms that have been suggested here to-night. One thing that pleased me was, that when the bulls were let out, there were some restrictions placed upon their use. We have been trying to impress upon our dairymen the necessity of being particular or methodical. If you put any scrubber of a cow to a good bull, then you deserve a scrubber for a calf. The suggestion that 5s. should be the fee for the service of the bull seems to me altogether ridiculous. A man who works for nothing gets all he deserves, and I believe a bull who gets calves at 5s. will get the class of cows coming to him that he deserves. I believe if the Department charged £1 per cow, and hedged that round with restrictions, there would be better bulls and heifers produced in this State. I am pleased to see that the Department did go in for restrictions. In New South Wales they have restrictions, and yet the dairymen run after the bulls and put their best cows to them. If you want to go in for pure stock, you must have a pure bull, and if you stick to that principle you will in time get together a first-class herd. If you want to get a pure bull, buy a pure-bred animal straight out. With respect to getting bull calves in New South Wales for a song, I must say that the song would be a pretty good one. The farm wives over there have good hens, but if you go to them for eggs they are very careful to dip them first in hot water, and I am inclined to think that the dairymen might have a habit of dipping any bull calves that they sold to you for 10s. Do not run away with the idea that you are going to get first-class bull calves over there for half a sovereign each, nor for anything within reach of it. Mr. Dudgeon there was offered £50 a head for the whole of his herd. It is his herd that has put up the record for so many quarts of milk a day and for so many pounds of butter per week. We often used to get a 4-gallon can at one milking, and I am sorry to say that the average cattle of the present day have degenerated from the cattle of the old times. There are some good dairy herds over there, and it is quite common to see cows producing forty shillings' worth of butter per month. The good dairy herds will produce every month from thirty to forty shillings' worth of butter per cow. The advantage of cows like that is, that you can reduce your labour, for the labour question is a big one, and is going to be bigger, in the dairying industry. You can reduce the area of your farm. When I passed through Queensland and saw the enormous scope of country that is not utilised, I wondered when I heard the talk that has been going on about people having to go for land to the back blocks when we are not using the land we have about our own doors. I know this matter of the Department introducing and letting out bulls is a difficult one to take up. I am particularly averse to anything in the shape of socialistic government; but we have had to-day a splendid illustration of what the Department can do, in the remarks that have been made about Mr. Benson. The dairymen of Queensland want educating. A man asked me the other day where he could get a really good Jersey bull. I asked him what was the last bull he had, and he replied, "An Ayrshire." "What breed did you have before him?" was my next question, and the answer was, "A Shorthorn." I asked him what kind of an animal he was trying to breed, and he said, "A cross." "And," I replied, "you will get it." If the Department could see its way to introduce a few good bulls, it would not be a great many years before good results would be demonstrated. They did it in New South Wales on a restricted scale at the outset, and the system has been an unqualified success. Of course, there were a number of dairymen who held off at first, but while they were complaining of the Department's action the more wide-awake dairymen were bringing their cattle to the Government bulls, and getting good progeny from their cows. In New South Wales bulls are let out to the agricultural societies, and someone is made responsible for the care of the animals. They are not allowed to run with the cows. They have to be housed, and otherwise carefully looked after. The cows are taken to them. There is a great deal in feeding bulls, and in this connection mistakes are frequently made by dairymen. They feed their cows and sow pigs, but forget to feed the bulls and boars. The bull is wasting his life-blood, so to speak, but the farmer forgets to feed him. Let him be kept healthy and vigorous, and his stock will always be the better for it.

Mr. R. WEEDON (Nerang): As one who has been engaged in dairying for a good while, and in the bit of Queensland that comes next to the Richmond River, I can tell you one or two things, and if the last speaker had not been here I could have told you some more. You need not think you can go to the Richmond River and get newly-born bull calves for 10s. You cannot do it in a good herd in Queensland, let alone there. Again, supposing you get these calves pretty cheap, and rear them, it will be a long while before they are any use to you. Moreover, you will be in such a hurry to use them that you will probably spoil them. It is only those who breed a considerable number of bulls who are able to put their young bulls away. Half the trouble in Queensland cattle arises from using immature bulls and from bulls that are too poor. If the Department takes on the work of lending out bulls, it should see that they are only sent to places where there is proper accommodation for them. I have had proper places for my bulls; but when they are shut away, they, especially the Jerseys, become very fierce, and it generally ends in the man letting the bull run out with the herd. What is really wanted is a secure stable and a proper yard attached, but the small farmer with a few cows can seldom afford such accommodation. The Illawarra cattle are all right, but they require a lot of feed, and, for myself, I have always maintained that we have already very good cattle in Queensland if you will only feed them.

Mr. McLEAN (Agricultural Adviser): We all know there is a celebrated breed of cattle down in the Illawarra district and, probably, in other parts of New South Wales. The Agricultural Department some years ago sent an officer to the Illawarra district to interview the best breeders down there, and to bring back all the information available on the subject. The information was secured and made public, but the result was anything but beneficial to the dairymen of Queensland, because, when it was known down there that there, was likely to be a demand for dairying stock up in Queensland, a number of very inferior animals were brought up, passed off as Illawarra cattle, and our dairymen purchased them. I do not say there are no good cattle down there, for I know that there are; but if it is known that there is a demand, inferior stock is likely to be palmed off for good. I think the New South Wales men are too cute to send their best up here, and I would therefore advise dairymen who go down there looking for cattle, to see that they get the best and not scrubbers.

Mr. A. WAGNER (Nundah): Mr. McLean's remarks explain what has hitherto been a bit of a mystery to me. I never could learn why these long herring-gutted cattle had acquired such a reputation, for to my mind they were not the stamp of dairy cattle. I heartily agree with the remarks that Mr. Sinclair has made. If you want to breed cattle, find out what kind best suits your requirements. In swampy land do not go for the Jersey. In heavy country he may do all right, but in swampy land I find the Ayrshire thrives best. A common mistake with many dairymen is to change their breeds too often. I have always held that it pays best to get good bulls, but the trouble often is, where to get them. Dairymen would be indebted to the Department if it employed thoroughly reliable men to assist farmers in the procuring and selection of bulls. The cost of a bull is not such a large item after all, if you only knew where to lay your hands on him. Bulls are plentiful enough.

Mr. J. McCartney: Our neighbours are buying up the bulls bred at the Agricultural College, and they change them amongst each other. The permanent bulls at the College are available for service to the public, but I do not think the farmers in the vicinity make much use of them.

Mr. R. Cliffe Mackie (Brisbane) gave an interesting account of the influence of telegony in breeding.

Mr. J. E. Dean (Maryborough): With respect to the comment on the statement in my paper that a certain cow which gave 12 quarts of milk daily only yielded 5 lb. butter per week, I may that the figures are correct, and it was because they were curious that I mentioned them. Although I am sorry Queensland cows have not come up to what I was used to in the old country, I may say that neither do the South Coast, judging from their records. It appears that in the districts where the Department has stationed bulls, farmers have not availed themselves of the opportunities presented for the use of the animals, although the charge made was only 5s. I can only say for myself that I would frequently have willingly given £1 1s. for the use of animals of the description I understand those bulls are. Mr. Sinclair mentioned the labour question, and his remarks bear out my contention that we shall in future have to carry on dairying in Queensland intensively rather than extensively. The tendency of the time is that we shall have to trust to the small dairyman, for it is only by intense farming that the carrying capacity of the land can be increased. In dairying the question of families is an important one, and in selecting a sire it should be the object of the breeder to secure an animal of a good milking line. If you take a bull of a good milking strain and breed from a cow boasting of similar credentials, you will have a chance of increasing the standard of your dairy cattle. Mr. Weedon referred to fierce bulls, which reminded me that, unfortunately, I had to destroy, a short while ago, a pure-bred Jersey for that very reason. I agree with Mr. Wagner in his opinion that it is no use putting Jerseys on swampy country, but at the same time it is no use putting large-bodied Shorthorns on to pasturages where there is not enough grass to feed them, for where you have large-framed beasts you must have plenty of herbage. Each dairyman must decide on the class of cattle best suited to his own circumstances. My requirements are as much milk as possible, and I like the quality of the milk to be good. If we are going to get the results in dairying that we ought to, we must have a better class of cattle than we have been working with in the past. It is quite possible to increase in some cases our yield of butter quite three-fourths of what it is now. I quoted, this morning, to a local farmer, the case of a cow giving 1 lb. of butter per day; and he told me it took his 30 cows to make 30 lb. of butter a week, and yet that man had been dairying here for thirty years. I know one man who gets 11 lb. of butter per week from one cow, and that is a three-quarter-bred Jersey.

The Chairman: I have much pleasure in congratulating Mr. Dean on the useful nature of the paper he has read, and also on the very intelligent discussion which has followed. The question of buying stock by the Department, or of increasing the operations of the Department generally, is attended at the present time by this difficulty: You know that the Government have been endeavouring to make both ends meet for the past three years. The finances have been deranged. We have been finding ourselves every year to the bad. We have been unable to meet our expenses from day to day. The people of the State have, in consequence, laid it as a mandate upon Mr. Philp that we are to live within our income. Last year, owing to circumstances, which you all know of, the Department of Agriculture, in addition to the sum which was voted by Parliament, and which the Treasurer, of course, knew had to be met, expended £18,000 over and above that amount in order to help the farmers. But I want you to understand that in endeavouring to live within our income we are doing what the country insists we shall do. There are many things that we should like to do, but which we feel must stand over. At present we are finding it impossible to live within our income, and until we can do that we must do what you or I must do when we have no money, and that is, wait until we have. If we cannot pay our daily way, what right have we to extend our functions? At no time has the financial position of the State been so serious. If the requests that are now made had been made a few years ago, when we had the funds, we might have acceded to them. At the present time it is very inopportune for any portion of the community to ask the Government to do things which it has previously not done. It has been stated to-night that there are bulls at the Agricultural College, Gatton. We are breeding bulls there, and, without being a qualified expert, I am disposed to believe that, from what I know of Mr. Mahon and other persons who certainly have the reputation of knowing thoroughly what dairy cattle are, these gentlemen are at present engaged in breeding and saving the bull calves which they think are promising enough, and disposing of them to the public. That is, we are in a way breeding bulls, but the request that is made to me is to supply bulls generally throughout the State, and that is one which, even if I were disposed to think it a good thing, at the present moment I am unable to comply with, for the simple reason that I am bound down not to go beyond a certain expenditure. I must not do it, and the other members of the Ministry are in exactly the same position. It is desirable, and eminently desirable, to endeavour to supplement our sugar industry by dairying. There are some districts not used now for dairying, but which are admirably suited to it, and I can assure you that the Government is fully seized of the importance of the dairying industry. But in importing bulls, whether it is done by the Government or by private enterprise, there is at the present time a most serious difficulty. That difficulty you will recognise when you know that if you go to the Tweed or to Illawarra, or to any other dairying centre in New South Wales, you bring bulls from places where ticks are not known, to districts where ticks have inflicted heavy mortality. I would not take upon myself to recommend anyone to import bulls from New South Wales, or not to do so. I should say, however, that the risk of losing the bulls you imported would be at least 50 per cent. We attempted to import bulls from the South into Mackay, in connection with the dairy factory there, and we did the same with heifers. We had them inoculated, and yet more than half of them died; so when you ask the Government, whose treasury is depleted, and who find difficulty in carrying on (for the public resent more taxation), to go out of the State and get fresh strains of bulls to distribute all over it, you ask us to undertake something very serious. You have heard the opinions of two gentlemen, and the opinion of either is entitled to respect—one that we ought to charge £1 per cow for the use of our bulls if we hire them out, and the other to the effect that the charge ought not to be more than 5s. What Mr. McLean tells us about the Westbrook bull is doubtless correct. When the bull was first placed at Westbrook it was believed that there would be a rush for his services, and, knowing that if we had to choose between good and bad cows it would be to the interest of the country to choose the former, we made a regulation that good cows should have the priority, and it is quite possible that some were refused. But we found after a while that cows were not sent at all, and in order to encourage the public to make use of the bull we removed all restrictions and reduced the bull's fee to 5s. We were still, however, so unfortunate as to have no demand on the bull's services, and the result is that I have had him transferred to Gindie.

Mr. J. E. Dean (Maryborough): The matter of Texas fever raised by the Chairman is certainly a serious one, but what I advocate is the introduction of either immune or young bulls. I have had considerable experience in Texas fever and redwater. Some people think they are separate things, but I do not for a moment think so. If bulls are introduced here while they are still young they would take the Texas fever, but they would recover and become immune. I do not think the percentage of losses would be very serious; and if 100 bulls were introduced into a Texas fever district, the percentage of deaths should not be more than one.

The next paper was by Mr. R. Cliffe Mackie, of the Queensland Stockbreeders and Graziers' Association, Brisbane, and was as follows:—

THE PROBABLE DRIFT OF THE PASTORAL INDUSTRY OF QUEENSLAND DURING THE PRESENT DECADE.

[By A. Cliffe Mackie.]

Horse-breeding.—There are no hard and fast lines defining the particular varieties that would suit a foreign buyer, as so much depends upon the use for which they are required, and the shady side of the question militates against the chance of popularising the industry. As the bike supersedes the hackney, so will the motor car oust the draught horse, and the mule come more into use with drovers and for other slavish work where extreme hardships are to be overcome. These conditions will, naturally, draw more attention to our own requirements when active draughts, stylish hackneys, carriage pairs, and ponies will represent Pegasus in the coming decade. If foreign buyers were made responsible for their statements anent the horses they reject, we would hear less about the deterioration of the Australian horses. It is a "parrot" cry which, to my knowledge, has been ventilated these last sixty years. The less equine experience our visitor possesses, the more declamatory he usually becomes. The Australian horse-breeder can be trusted to breed an animal that will compare favourably with the best equine productions in the world.

Cattle.—With regard to cattle, they will as heretofore depend upon environments, coupled with telegonistic principles. Breeding cows mated with the strains of blood most suitable to the quality of the pasture they are about to occupy will be used. This will lead to the establishment of extensive holdings, where two-year-old heifers, carefully selected to minimise the death rate from too early breeding, can be impregnated, and the sire absorption, through saturation, consequent upon first conceptions will influence the dam as well as the offspring, leading to a hall-mark in the herd, and do away with the old haphazard system. As smaller holdings increase, where the dairying industry cannot be successfully carried on the demand for this class of stock will increase, not only on account of early maturity and quicker returns, but the difference in the output, accounted for by a reduction in the number of dead-heads. As pastoralists have learned that noxious weeds and useless timber are unwelcome guests, so are slow-growing and sickly stock, and the necessity for negotiating them will lead to more economic introspection of their business, and the result a more thrifty general *régime*.

To minimise the losses from coming droughts, meat-preserving works will be built at convenient places along the railway lines or otherwise, to utilise stock as pasture fails. And now, with regard to the world's markets, the drift of European commerce towards the East is the silver lining to the cloud of uncertainty which hangs over our prospects, as competitors with Russia, Argentine, and other meat-producing countries, in disposing of our surplus supply—allowing we have it—after meeting our share of the naval and military requirements of Great Britain and the store cattle demand from New South Wales and Victoria. In the year 1900 the butchers' requirements of those two States were 600,000 head, and they were not equal to more than one-third of that number, because of the altered condition of their industries. This rapidly increasing demand for our stores is likely to control prices, and I cannot see where any development of the cattle industry in the Northern Hemisphere is going to affect us very much.

Anent our dairying industry, before the present decade becomes history it will reach such proportions, owing to China and Japan developing new gastronomic proclivities acquired through European associations, that it is safe to prognosticate a position for it as one of the leading export branches of the pastoral industry of our State.

Sheep.—As we begin to find out the advantages accruing from better attention to this industry, the growth of our natural grasses will be encouraged, and especially on uncultivated lands. We are fast learning to recognise the fact that it is the united influence of all the components engaged in the production to which we are indebted for the superiority of our wool, and any interference with the natural course of evolution will embody serious risks. Large sheep-breeding establishments will spring up in suitable localities, where the cultivation of green fodder can be profitably carried on to meet the demand for young sheep, which in limited holdings is more profitable than other stock. The idea will be to buy weaners, which in twelve months will yield a fleece and be ready for the butcher. The increase of small holdings will create a new shearing system, contractors will lease reserves from shire councils on which to erect shearing appliances, receive full-woolled sheep at one end of it, and deliver them shorn at the other. The fleece will be properly manipulated, classed, baled, branded, and consigned, also delivered at the railway station, if necessary. The quality will depend very much on the manager, and our ability to produce wools of a high class, especially merinos, is world wide.

Entomology.—We may expect with the advent of good seasons the usual insect plagues. The demonstrative use of dynamite in trenching lands has taught us how to deal with this pest. The larvæ beds rarely exceed 10 acres, the grub never boring more than an inch into the soil; insectivorous birds locate them, and a dose of dynamite, coupled with a Bill to establish a close season in perpetuity in all State lands within the settled districts, will give the birds a chance and reinstate the balance of Nature.

DISCUSSION.

Mr. W. Deacon, of Allora, considered that the paper was unanswerable, and that it was a good reply to those who had been harping on the alleged deterioration of our horses.

Mr. J. Mann, of Cairns, congratulated Mr. Mackie on his paper, as also did Mr. W. D. Lamb, of Yangan. The latter gentleman regretted that the sheep had been so much neglected at the Conference. During the last few years, sheep had been the most profitable animals on his farm, and he advised every farmer who could afford to keep a few to go in for them. There was an idea abroad that the small man could not keep sheep, but the speaker assured those present that any number from 50 to 200 would be found to return a handsome profit. For the small man an excellent cross was the Southdown ram on the merino ewe.

The next paper was by Mr. W. R. Harvey; and in the absence of that gentleman, it was read by Mr. G. W. Nixon, of the New Hope Farmers' Association, Birthamba. The lateness of the hour prevented any discussion taking place upon it. The paper was as follows:—

SUGGESTIONS AS TO HOW THE DEPARTMENT OF AGRICULTURE COULD AFFORD FACILITIES FOR FARMERS VISITING THE AGRICULTURAL COLLEGE AND STATE FARMS.

[By W. R. Harvey, South Kolan.]

In mixing with men who get their living by farming, I have been surprised to find what a little real interest is taken in advanced farming, either in good tillage, advantageous working, or neat and tidy finish; also in types of stock. A horse is a horse, a cow is a cow, a pig a pig, and so on. Now, in our days of experts, experimental farms, and agricultural colleges, this should not be; and I think it might be very much remedied if our Agricultural Department could arrange with the Railway Department for cheap fares—say, 10s. from anywhere in the Bundaberg district to the Gatton College and some of the experimental farms and back. Men would there see types of animals and methods of working which they cannot grasp from book or hearsay, and I believe things would very much improve. I would advise that all applications for a passage be made through farmers' associations, that none but members be allowed the concession, and that in parties of not more than ten or twelve in number once a year. Many farmers would get more good from this than is gained by them from the conferences, not that I would say the annual Conference is any but a good thing, as it has spread a great deal of knowledge among the farmers, for there is rarely a meeting of our farmers but an opportunity arises for speaking of the different experiences or opinions of delegates. But I think this proposal would vary things, and increase the good at a small cost. I remember when, at the Warwick Conference, visiting the Hermitage Experimental Farm, and one of the delegates was seen by me examining a sack of wheat curiously, and when I asked him if it was a good sample, he answered, "I don't know. What is it?" Now, this man was probably a good sugar-farmer, but I think men ought to know more than this about farming.

EIGHTH SESSION.

THURSDAY, 9TH JULY, 1903, 9·30 A.M.

After the transaction of certain formal business, Mr. W. D. LAMB, of Yangan, read his essay on—

LUCERNE GROWING.

[By W. D. LAMB, Yangan.]

The best land for lucerne is a deep alluvial soil, such as that on the banks of many of our rivers and creeks. If this is not procurable, the next best is that of the deep black soils of the plain country of the Darling Downs and other parts of the State. Shallow land, or land having a hard, retentive clay subsoil or hard-pan, should be avoided, as the lucerne plant is a deep rooter and requires a deep soil for its full development. No land is well adapted for lucerne-growing unless it contains a sufficient quantity of lime, as the presence of this plant-food is essential to its growth.

PREPARATION OF THE LAND.

Plough the land deeply some months before the seed is sown, so as to get it into the right condition. That means that the whole furrow must be brought into a state of fine tilth, so that when the seed germinates the young roots will be able to at once strike down deeply into the soil.

SOWING.

The best time to sow the seed is from the middle of March to the end of April, as this enables the lucerne to get a good roothold before the winter sets in, and thus be able to withstand the effects of the frost.

The drill is undoubtedly the best machine with which to sow the seed, as by its means the seed is more evenly distributed over the land than by hand sowing. From 10 lb. to 20 lb. of seed is usual per acre.

I believe in sowing the seed through the coulter, not by means of a broadcast drill, as the seed is thereby placed at an even depth and, consequently, comes to the surface more regularly. It is a good plan to attach a light wooden harrow to the drill so as to smooth the land behind the drill, and to follow this by rolling as soon after as possible.

If the seed is sown in autumn, the lucerne will, in an ordinary season, be fit to cut for hay in September. Lucerne is best sown by itself, as the presence of stubble or other rubbish, which is always present when the seed is sown with wheat or oats is thus avoided.

AFTER CULTIVATION.

Once lucerne is established, say, in twelve months after seeding, it is a difficult matter to over-cultivate it. The spring-tooth harrow or disc harrow is a grand implement to run through the lucerne after each crop is taken off, but if this is not always practical there must be at least one cultivation every spring. The more lucerne is cultivated the better it grows.

HARVESTING.

The best time to cut lucerne for hay is just when the first blossom is showing. The great mistake which most of our lucerne-growers make is in allowing the lucerne to get too far advanced before cutting.

GRAZING.

The great trouble in grazing lucerne is, that sheep and cattle are very liable to what is termed "blowing," but this can be overcome to a great extent by not letting the stock on to a paddock until the lucerne is 6 or 7 inches high. Once on lucerne, let the stock stay there, and if this precaution is taken, my experience has been that there is practically no danger from "blowing."

LUCERNE FOR SEED.

When lucerne is being grown for seed, the plants should be at least three years old, as it is not advisable to take off a crop of seed till the plants have reached full maturity and become thoroughly established. A dry season is far better for getting a crop of seed than a wet one.

The best time to cut lucerne for seed is when the lower pods are quite ripe and the upper pods are just turning brown.

Cut with an ordinary mower, taking care to remove the crop as cut out of the way of the horses by having one or two men to follow the mower for this purpose. A side-delivery reaper, or a reaper and binder without string binding attachment, can also be used.

When cut allow it to become thoroughly dry before stacking, or, better still, if machinery is available, thresh at once from the field, without stacking.

The ordinary wheat-threshing machine is suitable for threshing lucerne—in fact, it answers the purpose very well, with a little alteration.

YIELD.

The yield of seed per acre varies from 50 to 400 lb. per acre, which, provided all weather conditions are favourable, is a good paying crop, but the risks are great, as at least two good crops of hay have to be sacrificed to get one crop of seed.

DISCUSSION.

MR. J. GILLAM (Clifton): As my name has been mentioned in connection with this paper, I can say that I endorse everything that is in it, with the exception that there is not much danger in lucerne if you take precautions. It is a good crop, but it is also a dangerous one. I have suffered more from lucerne than I have from sorghum, and so have many of my neighbours. By putting stock in at night as the sun goes down and taking them out before the sun rises, I have never had a beast to blow, and I can recommend the practice to those who graze their lucerne. A neighbour of mine lost 100 beasts out of 200 in a single night by putting them on to lucerne, but he put them on in the day time, and not in the night. Lucerne is a very profitable crop, but people should be very careful with it. It is a crop that is easily gathered, and it is one that you can keep. I have known a lucerne stack to stand for seven years, and I believe they would stand for seventeen if they were properly made.

MR. J. MCCARTNEY (Forest Hill): I am interested in lucerne-growing, and can thoroughly endorse the remarks that have been made in Mr. Lamb's paper. I believe in deep ploughing—the deeper the better; for it gives the lucerne life. If you do not plough deeply, the roots will not go down. I have sown lucerne on deeply ploughed land, and when the leaf of the lucerne was 2 inches above the ground I have traced the roots to a depth of 8 or 10 inches. The deeper the cultivation, the further the main root will manage to get down. Lucerne will last from eight to ten years for cutting. As for the quantity of seed to the acre, that is a question that depends upon how it is sown. I have 150 acres of lucerne at Forest Hill, and I have no seed-sowing machine, so I am wondering what machine to get. Some machines sow 6 feet one side and 4 the other, with the result that unless you are particularly careful your sowing will be very irregular.

A DELEGATE: Get a drill.

MR. MCCARTNEY: I have always sown with the hand, and I can sow from 10 to 15 lb. to the acre, which I believe is correct. The black soil is best for lucerne. I do not know much about the effect of sheep grazing on lucerne, but I know that horses or cattle do not do it much good, especially when they trample on it when it is about four or five years old. Trampling causes the main stem to thicken and the lucerne to branch out; the main stem finally splits, gets affected by the sun, starts to rot, and ends by dying off. Sheep trampling on it may not have the same effect, because they move more lightly, but I would never advise a man to graze either horses or cattle on lucerne.

Mr. A. Hunter (Laidley): Instead of Warwick being the first place in Queensland where lucerne was grown, I think Laidley has the honour. I like deep alluvial soil for lucerne. On alluvial flats lucerne has one main stem, but I noticed when I was on the Downs that the lucerne seemed to stool more than it does with us. On our Laidley soils it sends down one stem 10, 12, or 15 feet into the ground. I have found that if you put a mowing machine too low you injure lucerne, for if the stubble is cut too close it splits and rots in the ground, and the lucerne is spoiled. In the early days when I started to grow lucerne, I could not get the nice brown hay that used to be sent up from the Hunter River. I sent my hay to Ipswich, but could not sell it on account of its green colour, but now the fashion is the other way round. Brown chaff in those days would always take the prizes at the shows, and, after all, I believe that it was better than the green stuff so much in demand now.

Mr. R. Weedon (Nerang): I grow some lucerne, but I am not going to inflict my experiences of growing Queensland lucerne upon you, because there is nothing to be said on the subject that Mr. Lamb has not dealt with. But I have a brother-in-law in the Argentine, and he tells me that country is a terrible place for lucerne, and it is there more used for grazing than for cutting. Of course they cut lucerne, but for 1 acre that we have here they have thousands—that is, according to his representations.* When the rainy season comes on, the lucerne grows so strongly that all the stock they have got cannot keep it from seeding. It seeds down in the ground, and when a man plants lucerne there he does not intend to have to plough it out. When it is set with lucerne it is reckoned to be set for all time. They have not the same weeds we have, and it always throws sufficient seed to renew itself. People have spoken about putting cattle on to lucerne when it is 6 inches high, and if they have nothing else on which to feed their cattle it is perhaps what they should do; but the fine cattle and horses that are reared on the Argentine are fed on lucerne that has some heart in it—that is, when it is ripe. The time our bullocks fatten is when the grass is in seed, and that ought to give us a hint as to the best time to feed lucerne. We have been told to cut lucerne as soon as it comes into flower, and that is perhaps the most profitable time to cut it, especially if you are aiming at colour. But it is very doubtful if your beautiful looking chaff will have the same feeding value and nourishment as lucerne cut later.

Mr. H. A. Tardent (Toowoomba) asked whether any delegates had an experience of the effect of lucerne on cattle affected by ticks. It had been stated that in other countries it caused the ticks to drop off, and he believed that Mr. R. Beiers, of Childers, had tried the experiment with success.

Mr. W. D. Lamb (Yangan): I was pleased to hear the favourable comments that were made with respect to my paper, and I may say that I do not know what I should have done during the late drought if it had not been for lucerne. There is not another plant in the State, not even the *Paspalum* or the prickly pear, that is the equal of lucerne. My experience of lucerne is quite contrary to what is said to be the Argentine's. I know that when seed falls to the ground and the lucerne plants are in the ground that the lucerne will come up if the weather is favourable, but when dry weather comes those plants die out. When the plants get old and run out, the best thing is to plough them out and re-sow. With respect to the deep rooting of the lucerne plant, I may say that when well-sinking I have noticed lucerne roots go down the whole side of a 26-feet well.

The Chairman: I can congratulate the gentlemen who took part in the last discussion on the valuable information that has been afforded to the other members of the Conference. Old colonists like Mr. Lamb are of observant disposition, and they possess mature judgment. Anything that comes from persons possessing those qualifications is of great value to the general community.

* On some estates in the Argentine there are 100 square miles of lucerne.—Ed. *Q.A.J.*

AGRICULTURAL INTERESTS AFFECTING THE SMALL FARMER AND PRODUCER.

[By F. W. PEEK.]

In bringing forward a paper under this heading, I do so in the endeavour to deal with matters that are continually being brought under notice concerning the various little troubles that beset the average farmer and small producer in this State—often owing to the want of a little thought, energy, or simple knowledge on his part—and the consequent grumbling and growling with the conditions that are, instead of using the best endeavour to obtain such improvement and betterment in his surroundings that would conduce to more pleasure, greater facilities, and larger profits for the time and trouble expended in working the land, and giving a practical result from his labour on the farm holding.

FARMERS' DIFFICULTIES.

A great many of the so-called troubles besetting an individual settling on the land in this State are caused by the lack of knowledge of what to do and how to commence operations at the proper time or season. This can be traced to the fact that numbers of persons who take up the land for general farming, fruit-growing, &c., have had no practical training—not even simple rudimentary knowledge or education—on any of the factors that go to make success in treating the various crops it is intended to grow. The first thing is to decide what branch of agriculture shall be chosen—whether sugar, fruit, wheat, dairying, or mixed farming. This having been decided (after having made all possible inquiries), let all future operations tend to bring about a success. Here we come across the first little difficulty, namely, the choosing of that portion of the State likely to be the most favourable for our operations. It is here where the Department of Agriculture should be able to take the would-be farmer in hand, by disseminating the knowledge and information as to what land is available for occupation and suitable for certain cultures. The geographical features, as well as the climatic conditions most favourable for future operations, with statistics that are reliable as to area, rainfall, cropping, labour, &c., should be always available at any time, instead of, as at present, having to apply to first one office, then to another, and, finally, not being enabled to obtain the information desired.

Of course, the great principles which underlie success in agriculture are the same everywhere, but there are peculiar features in the various soils which call for special treatment, and unless these matters are known eventual failure must necessarily ensue, and a loss of labour and outlay, which could have been turned into a splendid success if locality, climate, suitability of crop, &c., could have been first ascertained. The difficulties met by our earlier farmers and producers in the direction of experimenting with crops as to their suitability, &c., have passed away, the department having wisely undertaken the work of experimenting in various parts of the State as to what can be climatically grown. But this is hardly sufficient. The question most difficult to answer relates to the growing of such crops for profit, and the possibilities of remunerative markets, &c., when grown. It is to this latter question—*i.e.*, the putting up, placing, and marketing of the crops—that I desire to more particularly draw attention in this paper, together with the best system for united action in small districts for obtaining information and dealing with matters that are continually occurring as difficulties to the individuals concerned.

COMBINED EFFORT.

Ever since the inauguration of these Conferences there has been a steady increase in the number of societies which have been formed to assist the members in various ways, and as secretary of the Chamber of Agriculture, I am constantly in receipt of inquiries as to the best means of procuring seeds and plants, or concerning the disposal of products, and in every case I strongly advocate co-operative effort as being a means to attain the best results. Although agricultural co-operation will necessarily make slow advances here, yet I am sure it will not be long before the small beginning that is now being made in various parts of this State in the way of marketing crops and the purchase of seeds, &c., will be generally adopted and recognised as a better and safer system of dealing than that at present adopted.

In the case of agricultural production the reward of intelligent combination is at once felt. Neighbourly assistance in ploughing, fencing, harvesting, clearing, &c., are too well known and appreciated for me to enlarge upon, and I merely wish to draw attention to the power for good that may be exercised by the formation of individual farmers within defined areas into societies for the more profitable conduct of the agricultural industry in all its branches. This can only be accomplished by organisation. We are living in the time of large transactions, with a rapidly increasing area under crop, and we are now seeking for information as to outside markets; but unless we can place our products in those markets under the very best conditions as to quality and grade, and in sufficient quantity to hold such markets when obtained, we shall be ousted by more intelligent competitors.

It is impossible for a farmer to depend upon local markets now, as in former times, when he had it practically all to himself. The advent of federation and the removal of interstate trade barriers have opened up local markets to southern growers, who have been longer in the race and whose conditions in producing certain lines of products are more favourable than those of Queensland. It is incumbent upon the farmer to produce the best article in order to secure the best profits. The days are past when the small farmer could afford to isolate himself by keeping in the same old rut. He must alter the old conditions to suit the times. Every day we find new methods brought under our notice. Science is being applied to the industry we are representing here to-day in such a manner as is not applied to any other industry. We know that science is battling with the forces of nature in various ways, and in no direction in this State can scientific knowledge be made more beneficial than to the man on the land who has to abandon his old slipshod methods and adopt the latest methods of up-to-date culture.

This would mean expense to the individual farmer, but that expense can be greatly minimised by a few farmers combining together to obtain their requirements at the lowest possible cost.

One of the most useful objects our societies could have devoted themselves to during the late drought would have been the importing and purchasing of feed stuffs direct for their members and their districts, and also the question of seed supplies. Manures, fertilisers, &c., could be treated in the same manner. These things are sold at a much cheaper rate wholesale than when they are bought in small quantities, and it is only by co-operation that small farmers can hope to obtain reasonable prices. We also know that often a farmer requiring only a small quantity does not get the quality that he expected. But the advantage to be obtained by a society buying collectively would be to insist on a guarantee that whatever seeds, &c., were purchased by them should be of the best quality as paid for. The same benefits can be applied to the purchase of stud bulls, boars, or stallions for the improvement of the stock held by members. I would like to emphasise this matter. One of our great difficulties in the way of progress is the need for improving the stock of this State, and bringing them up much nearer to the level of pedigree stock—a matter to which the dairy farmers in the Northern districts of New South Wales are now paying great attention. The practice of selling by weight being now the recognised method of disposing of most products can be met by a weighbridge being owned in common. Again, the more expensive agricultural implements which one man has not the means at his disposal to purchase, or for which he would not have sufficient use, could be purchased by the society, each member taking his turn in using them. Co-operation would also prove of great advantage in the matter of railway rates. It is well known the rates are higher for small quantities than for large ones, and by farmers combining together to purchase their supplies, or in sending their products to market, every advantage could be taken of lowering their individual cost in this direction. I know this matter of self-help by co-operation does not appeal to every person in the same degree, but everyone admits that it is the right idea, if—ah! that little "if" —the farmers could only be organised. They know that it is only by joining forces that something can be done to assist them, and that is what is wanted to-day. There is the feeling now spreading that co-operation is no fad. The information that is being published of the success attained in other countries and States is awakening the farmers here to the secret of their success, and all that is required is action on lines safeguarded to attain similar results for the farmers of Queensland.

In advocating co-operation, I do not wish it to be understood that I advocate the total abolition of so-called middlemen or any serious disturbance of trade. The producer cannot distribute his own produce right up to the doors of the consumer, but he can control its distribution, and can greatly lessen the number of middle profits which have to be paid to so-called commission men, who attempt to corner markets and exact commissions. I would add here that great praise is due to the Press of this State, which publishes the daily market reports in a manner that helps to prevent jobbery, which farmers have paid dearly for in the past.

I will close this paper by a suggestion for the serious consideration of the Minister for Agriculture:

First—What is desired, is the employment of persons of State experience—men who may not be experts technically, but who have stores of practical knowledge and advice, and who can explain in simple language, and show by illustration, or by medium of lantern slides, what is practically being done and achieved in other parts of the world, or even in this State; who can visit the various parts of it, demonstrating and instructing in a simple but practical way. Our present experts cannot be everywhere, but this is one way of achieving a vast amount of good.

Second—The desirability of showing to as many people as possible what is being done at our experimental farms, by making it convenient, by low railway fares, to visit the College and other institutions under State control, where the principal or person engaged could show the various methods employed.

This, I think, would be a first step in agricultural education, feasible, and not costly to the State, and could be defrayed out of the vote granted to agricultural societies.

DISCUSSION.

Mr. C. P. Mau (Mackay): I take it there is very little to be said in reference to Mr. Peek's paper, because he has traversed the whole ground of the subject. You all know what co-operation is, and I can tell you that in Mackay we carry co-operation into practical effect. I want to impress upon you that without co-operation farmers cannot get for their produce what they should. In our district, our association periodically calls for tenders for supplies, and this system has lowered the prices that we have to pay for the articles that the members have to purchase by from 15 to 25 per cent. I am glad Mr. Peek mentioned the subject of rice, for it is a crop that our sugar-growers might well direct their attention to. It is quite evident that the time has come when we sugar-growers must go in more for a bit of mixed farming—say, a little dairying; so that when a drought or anything else happens we shall not have all our eggs in one basket.

Mr. W. S. Palmer (Bowen): A few years ago the farmers in our district were disorganised, but we formed an association with an annual subscription of 5s., and we now club together and buy what we want. For instance, we have bought a bull who is shared by five of our members. Each member of the association, who has a share in the bull, has a right to have him for a certain time; and we find that the plan has worked very well so far, after three or four years' trial. To show how a saving can be effected by combination, one of our members, in the purchase of spraying material, saved £2 in one consignment, and all that this privilege cost him was his 5s. subscription to the association. To give another idea of how we combine, I may say that since I came down here I have been commissioned to purchase pigs and poultry for several of our members.

Mr. A. Wagner (Nundah): I am sure that none of us can cavil at anything in Mr. Peek's paper, but he might also have pointed out that it is the duty of the Department to warn people from going on to bad land. The failure of many men going on to the land is through their having no knowledge of what a good piece of land is. A man is desirous of forming a home; he goes on to a piece of land, and spends time and money on it, and is only rewarded by failure. I have come across hundreds of such instances between here and Brisbane, and it is wonderful to see the waste of capital that has taken place. A lot of land has been thrown open for selection that was fit for nothing but timber reserves and to break the hearts of those who tried to make their homes on it.

Mr. J. A. Hayes (National Association), to show what co-operation could do, instanced the districts competition at the National Association's annual exhibition in Brisbane, and alluded to the fact that, after the last show, a large amount of capital had been introduced into the Moreton district as a direct consequence of the district winning the first prize in the districts competition.

Mr. G. Turner (Bowen): A short paper was read on the preceding evening on the subject of the Department of Agriculture affording facilities to farmers to visit the College and the State farms. I may say that I took advantage of my recent visit to Brisbane to go to the College, and I found that the Department afforded me every facility to do so. The return ticket by train, second class, from Brisbane to Gatton, only cost me 8s. 9d., and I certainly had that out of the trip. We, Mr. Palmer and myself, were met at the station, and the Principal showed us all over the College. All the officers of the College showed us over their particular departments, explained what they were doing, and what their objects were. I think if any farmer is in Brisbane, and has a day to spare, that he cannot do better than spend it at Gatton College.

Mr. G. N. Terry (Stanwell): In my opinion Mr. Peek's paper is one of the most useful that has been read at the Conference. It is a paper worth thinking about, not only here, but afterwards when they have got home from the Conference. He referred to the local market, and clearly showed that those who trust to the local market will find themselves in the Insolvency Court. Practically, except in one or two particular lines, there is no local market. Independently of the sugar industry, we really have no local market. We must, therefore, provide for an export one, and what he says with regard to having everything up to date is quite right. He referred, moreover, to scientific methods and up-to-date machinery, and there is a great deal of truth in the contention that we must be up to date. We must bring science to bear upon farming, and we must have the best implements, but we must prove that those implements pay interest on their cost. If they do not pay that, you might as well let them alone. If they do not pay us 3 per cent., we might as well put the money in the Savings Bank and go on the labour market and get our 8s. a day. I believe in co-operation thoroughly, and I am glad to see that the editor of the *Agricultural Journal* is of the same opinion, for he has been continually advising the farmers of Queensland to go in for it. While, however, you can go in for co-operation in the matter of a butter factory or in the matter of a threshing machine, it is impossible to co-operate in the matter of agricultural implements that are wanted every day in the week. Some of the farmers in my district are the most liberal-minded of men in everything but farming, and there they are most conservative. You cannot get them to work together for two minutes. You cannot get two to be of the same opinion. You can introduce an implement at a meeting, and if there are forty at the meeting there will be probably forty opinions about the implement. Before you can make co-operation a success, there must be a unanimity of opinion; and the getting of that unanimity seems to me the greatest difficulty in connection with co-operation.

Mr. F. W. Peek: The main object I had in writing the paper was to endeavour to draw attention to the question of self-help. I have often had plenty of difficulty in getting farmers to come together; but when they have come, I am only too pleased to be able to say that they have requested my presence again. Organisation is the whole secret of the matter; and if the authorities will take into consideration this question of agricultural education, immense benefit will result to the State. We know Mr. McLean has done a good deal in the past, but he cannot be everywhere, and he is only one man. Technical instruction given by experts who have a really practical knowledge of the conditions of the State we are living in, is what is required. I shall be quite satisfied if you will take the paper back to your societies and discuss it with your members as a practical means to an end.

Mr. George Turner then read the following essay on—

TANNING MATERIAL AS A PROFITABLE CROP.

[By George Turner, representing the Farmers and Fruitgrowers' Association, Bowen.]

The soil and climate of this State are well suited for the growth of numerous plants producing a high percentage of tannin. The Museum of Economic Botany in Brisbane contains seven indigenous specimens of Acacia, the barks of which yield from 7·50 per cent. to 15 per cent. of tannin; and at the Melbourne International Exhibition of 1888 twenty-one indigenous or naturalised varieties of tanning plants were on exhibition from this State, among them being black wattle, unrivalled in Australia as a tanning agent.

Under the circumstances it seems strange that the importation of bark for tanning purposes is still continued, and that no concerted action is taken by growers within the State to supply the demand. The statistics for 1901 (the latest available) show that 1,983 tons of bark, valued at £18,014, were imported and used at forty tanneries to produce £164,509 worth of leather. That the consumption of tanning material is capable of enormous extension will be seen if we consider the number of hides that are exported from the State, the value of which might be doubled if turned into leather. The average value of hides and skins produced at the various meatworks in Queensland for the last seven years has been £290,252, and the value of the annual export of hides and skins from the State has reached £515,151. Had these been turned into leather as suggested, it is probable that £50,000 worth of tanning material would have been required annually, and about 1,000 men would have found employment in the tanneries alone. Although the wattle is indigenous in Australia, so little attention has been paid to its cultivation that other countries have been able to introduce the best varieties and become extensive exporters of bark. In this way Natal, where wattle-growing was only commenced in recent years, has increased her export of bark from £12,569 worth in 1894 to £69,850 worth in 1901. The present value of bark is £7 10s. per ton f.o.b. Durban; and the area under wattle is being rapidly extended, as the crop has been proved to be remunerative, and the trees are hardy and will withstand drought. One great drawback in connection with wattle cultivation is the length of time required for the trees to reach maturity, very few farmers being inclined to put in a crop on which they must wait from five to seven years for a return; but as wattle-trees require very little attention beyond protection from bush fires, and the returns, when once secured, will be fairly large and continuous, we should plant for our children's benefit if not for our own. The soil need not be the best on the farm, and any odd corner not suitable for cultivation will grow wattle. Care should be taken to obtain a variety yielding a large percentage of tannin, and to make certain of the seed germinating. It should be well steamed and soaked or mixed with hot ashes before sowing. This preparation is most important, as seed has been known to lie dormant for a great number of years until a bush fire passing over the ground supplied sufficient heat to cause it to germinate. Intending growers would do well to read a pamphlet, "Wattles and Wattle Bark," by F. H. Maiden, Sydney, 1890, wherein full particulars are given as to the best varieties to grow, the proper soil and method of cultivation, and the probable returns.

In addition to the wattles, there are many other tanning plants suitable for cultivation in Queensland, some of which possess the great advantage of maturing in one year. Canaigre (*Rumex hymenosephalus*) is a native of Arizona, and is found also in Texas and Mexico, where it is used as a tanning agent. The plant resembles a dock, and its roots, which yield the tannin, grow like sweet potatoes, being from 4 to 8 inches long and about 1 inch in diameter, as many as thirty being found in one hill. When freshly dug the skin is smooth, but it soon becomes corrugated on exposure to the atmosphere. Grown in Victoria, where it is acknowledged that the soil and climate are not so suitable as in Queensland, canaigre, when dry, gave 33·4 per cent. of tannin, as against 17 per cent., which is about the average for wattle bark. A dry, light, sandy soil in a warm climate is most suitable for its cultivation, and it is said by Mr. Clark, who experimented with it in Victoria, to be as easily grown as sweet potatoes, and to yield about 7 tons to the acre. Allowing for a reduction of 50 per cent. in weight when dry, and calculating the contents of tannin on the basis of the price paid for wattle bark—namely, £7 10s. per ton for bark yielding 17 per cent.—canaigre promises a return of about £50 per acre. In adopting this plant, growers must not lose sight of the fact that, so far, our Queensland tanners have neglected to try it for tanning purposes, although they have been provided with samples by the Department of Agriculture. It would, therefore, be necessary at first, until a market could be found within the State, to export it to Melbourne, where tanners who have practically tested it report it to be superior to bark, and say they are prepared to buy it in any quantity.

The tendency now-a-days in the tanneries is to use liquid extract as a tanning agent, it being more economical than bark. For the purpose of making extract, twigs, leaves, bark, and roots of plants yielding tannin may all be utilised, and if manufactured at the plantation the freight to market is much smaller on the concentrated extract than on dry bark. Wherever plants yielding a fair proportion of tannin are found growing, extract may be successfully manufactured; and this seems to offer an easy and payable method of utilising the mangrove round our coast, much of which yields a high percentage of tannin. Samples of mangrove bark sent from Cooktown to London some years ago gave on analysis 28·80 per cent. and 36 per cent. of tannin, and were valued at £4 or £5 per ton. There was no demand for the bark, owing to its sanguinary red colour, which proved very objectionable, as leather finished red will not realise a good price, although its wearing qualities may be first class. In making extract, the red colour might be neutralised, or tanners could finish the sides with some other material that would stain them a more approved shade.

Though not immediately connected with the object of this paper, I would like before concluding to say a word to those who have to do with the branding and flaying of hides. The loss through placing the brands on the most valuable parts of the hide, and carelessness in skinning, is estimated by competent authorities to amount to 2s. 6d. or 3s. 6d. per hide, and leads to the entire exclusion of our leather for army and many other purposes for which it is otherwise well suited.

DISCUSSION.

Mr. W. Ewart (Nundah): This is a paper I intended to speak upon as soon as I saw it on the programme, for it treats of a subject that I have always been deeply interested in. I believe my father put down the first tannery in Queensland. When he first came here, the hides were flung away. You could not sell a Queensland hide, the fault in them arising from the branding and also from the flaying. When he first started his tannery, he had to pay the slaughtermen out of his own pocket to take the hides off carefully, but he had not to do it for long, for the butchers soon saw the value of the hides and made their slaughtermen flay properly. We have a bark in Queensland, and large quantities of it, which contains any amount of tannin, and that is the ordinary ironbark. Latterly my father used it entirely. There is very little waste in the grey ironbark, and it is therefore much superior to the other, but the fault with the ironbarks is that they are really too good. They are slow, and that is the reason why they cannot compete with wattle. With wattle bark you can run leather through in 4½ months, but that is not tanning. You cannot tan leather under 9 months with ironbark. But when using oak the best English tanners generally give their sole leathers 9 months. You cannot tan with ironbark at a rapid rate, because, if you attempt to force the process, you harden both sides of the leather, and the tan does not go right through, with the result that the white shows in the centre. I have experimented with mangrove, but it is a dirty tan. The ordinary fisherman tans his sails with mangrove, and anyone who has seen a fisherman's sails knows the dirty colour they have, and leather takes the same colour. Colour, however, is a matter of taste; and if you turn out a really first-class article, people will not object to the colour. Wattle will make a first-class tan if you give it time, but wattle forces the tanning operation. It preserves the leather, and the fact of its quickness makes it difficult for other tanning materials to compete with it. It does not make so good a leather, however, as some of the slower tans.

On the motion of Mr. McCartney, Mr. Turner's paper was referred to the Resolutions Committee—

Mr. H. Sinclair, of Booval, then gave the following address on—

DAIRYING IN QUEENSLAND.

[By H. Sinclair, Booval]

As dairying must shortly become one of our leading lines of production in Queensland, my choice of subjects needs no apology.

The way is open for rapid and vast expansion of the industry, the demand being almost unlimited for dairy produce of good quality at reasonable prices.

The imports of butter by Great Britain for the year 1902 was 198,708 tons, the value of which was £20,000,000. The supplies were drawn from the following countries, viz.:—

Denmark	84,152 tons
Russia	24,451 ,,
France	20,708 ,,
Holland	19,663 ,,
Canada	14,288 ,,
Australasia	11,922 ,,
Sweden	9,580 ,,
United States of America	2,723 ,,
Germany	1,320 ,,
Other countries	8,901 ,,

Of the 11,922 tons supplied by Australasia, New Zealand contributed 7,900 tons, Victoria 3,140 tons, New South Wales 881 tons, and our own State is credited with 1 ton only; this, of course, being incorrect, as our export of butter for that period was over 200 tons, but, as our exports go *viâ* Sydney, New South Wales is credited for what we do.

Our State Government could assist the industry considerably by providing shipping facilities that would enable deep-sea boats to load at the Brisbane port. The freights to Sydney are 25 per cent. of the total freight to London, and, in addition to being considered insignificant, our produce is damaged through excessive handling.

My object in this paper is not so much to try and induce dairymen to endeavour to produce two blades of grass in the place of one, but to produce £2 in place of £1. But our grasses need attention, and the person who will introduce artificial grass or grasses suited to our soil, that will stand our climate, will be a benefactor to his fellowmen.

The abundant growth of herbage having volatile gases to taint our butter can only be eradicated by artificial grasses that will force them out of our pastures.

The loss to our dairymen through tainted milk is considerable, and would soon pay for seed to sow our fields if prevented. But a heavier loss to which I wish to draw attention is caused by the indifferent methods we have in the conduct of our dairying operations. It is evidently thought by many that cream should be purchased by the butter manufacturers in any state of fermentation, cleanliness, or want of cleanliness.

During our flush season 1901-2 our income for butter in the West Moreton district was £100,000. The loss to our dairymen on the butter produced was quite quite £5,000, chiefly caused through infrequent deliveries of cream to the manufacturing centres and other indifferent treatment. We may add to this a more serious loss of at least £100,000 for butter not produced, which should have been, from the same herds and pastures. It is very questionable if our cows have returned their owners 10s. each per month, whereas every dairyman should expect each cow in profitable condition to return him £1 per month or £9 during each period of lactation. This is not a high aim, providing the price of butter is not lower than 8d. per lb.

A cow should reasonably be expected to yield 260 lb. of butter each season. These results can only be obtained by the dairyman attending to his business in a methodical way. There is great necessity for system and accuracy. The person who merely guesses the amount of fodder each animal consumes, guesses the return for her produce, will guess in the end that dairying does not pay. I would suggest for each cow a fixed maximum of food and minimum of production. Say 550 gallons of milk, 260 lb of butter, or 600 lb. of cheese each season, and by the systematic use of scales and Babcock test see that these results are achieved. Weighing and testing should be done at least twice a month, and each cow's performance recorded, and her record checked just as carefully as one would check his grocer's bill. It will pay the dairymen to be continually selecting his cows and carefully noting the form of his best producers, nothing being too insignificant to be noted, and in a few years he will become expert in his judgment of good dairy cattle.

The matter of breeding also demands serious attention, and should be conducted with the same precision as selection. It is advisable to decide, first of all, what breed is most suitable for the special purpose for which the cow is intended. A general purpose cow is a freak of nature. A good milker and beefer are rarely wrapt up in the same hide. Having decided on a breed, secure a sire from good stock of his kind—one of mature age for preference—as one of Nature's laws is to reproduce. The sire of mature age mated with younger dams will mark his progeny more effectively than younger sires with older dams.

As the progeny of this sire will be very much more in proportion than that of the dam, it is very important that his breeding should be pure and of good strain. Having secured a sire of satisfactory breed and strain, build up from dams that are known to have a good milking record. Their particular breed will be of little importance in starting, as by building up from sires of pure blood of the same strain the breeding will right itself in a few generations. A sire may be kept three or four years, providing his own stock are kept away from him. He should be replaced when necessary by one of his own breed, but in no other way related. The indiscriminate mixing of breeds cannot be too strongly condemned. We can, with single blood, bring out the desired points for profitable dairying. In fact, mind can triumph over matter in this respect, and it is always safe to say, "Like will produce like"; and the pure stock which we breed will transmit their excellence to their offspring.

The business of securing high-class sires for dairy stock might be taken up in safety by the Department of Agriculture, and such sires let out on hire to responsible bodies for service among the farmers' stock. There is no necessity to spoon-feed the dairying industry, and few would object to pay for services rendered in this way.

The matter of a Dairy Supervision Act also demands attention at the very earliest opportunity, with which should be issued by-laws regulating sanitary arrangements on the farms and at the butter factories, as well as the proper inspection of cattle and destruction of diseased animals. The administration of this Act should be entirely under the control of the Agricultural Department whose inspectors would have definite regulations to enforce. In addition to inspectors, a few up-to-date instructors might be appointed to give practical demonstrations on the farms, and in this way educate our people in the most up-to-date methods. A point that should not be lost sight of is the over-run that should be allowed on the Babcock test to balance the churn results. It is just possible that our system of testing is not absolutely correct. Our charts have been compiled by irresponsible persons, and do not carry the weight of departmental sanction. All other weights and measures are subject to inspection, while the whole system of testing milk or cream is left to the control of those interested.

In conclusion, there is plenty of room for Queensland in the competitive race for the world's dairy produce markets.

DISCUSSION.

Mr. R. Weedon (Nerang): While cleanliness is an essential point in butter production, it is still more so where you have to preserve milk. The slightest quantity of dirt in milk for condensation purposes spoils it, and I may tell you clean milk may be very largely secured by using covered cans instead of great open pails to catch every bit of dirt that is knocking about. Another way of ensuring cleanliness is, instead of making stables for your cows, to put clothing on them, and give them nice dry sand to lie on. If this is done, they will be ready for milking in the morning far cleaner than if they had been shut up all night in dirty sheds.

Mr. Atkinson (Danderoo): I note that in his paper Mr. Sinclair condemns the notion that some people have, that they can cross our common cows with Jerseys or Ayrshires, thereby improving the quality of the milk from the herd, and afterwards go and improve the quantity by crossing the resultant stock with a Holstein bull. In the matter of dairy supervision, I may say that the farmers around our way are very dissatisfied with the tests as they are given by the factories. It is stated up our way that a certain price is given for a 3·6 standard, but that the factory takes care that you very seldom attain to that standard. In comparing their returns with the Gatton College returns, which are published every month in the *Agricultural Journal*, the difference is surprising. I do not say that the factories give wrong tests, but it is certain that the farmers would feel much more satisfied if the tests could be checked occasionally, and I think they should be. Farmers are recommended to get Babcock testers, and all that sort of thing; but, apart from their expense, the farmers have neither the knowledge nor the time to work them. I know several farmers who are going out of the milk supply business because they consider they are not getting what they should for their milk. It is an unsatisfactory state of things.

Mr. W. Berlin (Rosewood): I am very glad that we have had Mr. Sinclair here to-day, for there are lessons to be learned in the dairying industry every year of our lives. I have been at dairying these last twenty years, and have not yet by any means attained the highest standard of excellence. There are many things to learn even in cleanliness. Cows are often rushed into yards, and there is no time to clean their udders. I have made it a practice to milk most of my cows without bails in the open yard, and every cow's udder is either washed or rubbed with a dry towel. I, of course, also see that my hands are perfectly clean. Milk should be put through a close strainer, and put in a place where there are neither dust, bad smells, nor bad air. Dairymen should be very careful how they handle their cows. I never allow a dog to enter my place, nor do I allow a dog among my cattle. Cows should not be upset on any account, and, as illustrating the extreme sensitiveness of the cow's constitution, when I am away from home, my son or my daughter never get the same amount of milk or cream from my cows as I do, who am constantly handling them. Feeding is a great point in dairying, and I have frequently noted that, if cows do not get their breakfast immediately after the morning's milking, an appreciable decrease is observed in the result of the evening's milking. Every man has his hobby, and the Jersey is mine, and I do not think anybody would ever turn me from it. As useful a cow as you can get is the first cross of the Jersey with the common cow.

Mr. Pike (Brooyar) advocated the Railway Department putting on cream vans for the conveyance of cream to market; and Mr. W. Beale, of Childers, detailed the points to be observed in the selection of a cow for milking and breeding purposes.

Mr. W. D. Lamb (Yangan): I am not a dairyman, but a little while ago I was over in Denmark, and when there I think I got a pretty good insight into the dairying industry of that country. I was in at least half a dozen factories, and I could not help remarking the high esteem in which cleanliness was held. But otherwise they were not much in advance of butter factories in Queensland. They employ females instead of men, but I do not know whether that makes much difference in the manufacture of the butter. They use little casks for their butter instead of boxes, and in that respect I think we have the advantage. The cattle are all tied up, and are not allowed to graze. The rope is tied to a peg, which is shifted every day, and it is rather a remarkable sight to see the rows of cattle along a paddock. I could not help noticing the poor nature of the country and the soil, and I think we have infinitely better soil on the poorest of our lands. The land has been simply made, for it evidently was originally nothing but sand. It is the winter they have to contend with. They have to shut their cattle up in a barn or stable and keep them there for nearly six months, feeding them on stuff which they have grown during the summer. We have practically no winter here, and I certainly think there is a wonderful future for the dairying industry in Queensland.

Mr. Sinclair: I am pleased to have an opportunity of adding a few words to my original paper. Some of the remarks that have been passed by the speakers could perhaps be gone into very carefully and at much length, but I do not intend to do that. With regard to breeding for quality in the milk, it should be remembered that the way to reckon up what a cow is capable of producing is to work out your problem on the basis of the food she consumes. If you are going to build up big clumsy cattle, then you must build up great stacks of feed. There is room for a vast deal of difference of opinion with respect to breeds, but the locality in which a man is situated will generally decide this question for him. I have been asked what I think of the Kerry cattle. The Kerry cattle are excellent little animals for hilly country, which suits them very well, but there is one objection to them on the black soil flats, and that is, that they are too small. In hilly country, big clumsy animals will not suit. But there are good milkers in all breeds, and if you want to go in for the general purpose cow, which some seem to think is a possibility, although I do not, then the Shorthorn comes as near to that requirement as it is probably possible to get. I do not base my remarks on my own opinion, for I have been a long time in the dairying industry, and a good deal of my time has been taken up in the management of butter factories in New South Wales. I have always been careful to note the results of the different dairymen's returns, and my experience has been, from the returns of other people's stock, that the old Illawarra cattle and the Shorthorns have knocked everything out time and again. I am not giving you my own personal opinion, but I am giving you what I know to be true by actual results. There are a lot of good hard-headed dairymen down there who do not go in for hobbies. Jersey cattle are very nice, and, speaking of hobbies, reminds me of what I have often said with respect to starters for cream. I believe in starters for cream, for the reason that it makes the man who uses the starters careful. It makes him watch the cream very carefully, which he would not do if he had not used the starter. So with the Jersey, if people make it their hobby they feed it for all it is worth. I remember once testing cows at a show to which a gentleman, who wished to make a name for his Jersey herd, had brought a Jersey cow and two Shorthorns. He was giving the milk of the latter to the Jersey, and upon my asking him what he meant, he replied that there was nothing said in the conditions of the competition about the feed that was to be allowed the animals. I retorted that it was rather a poor recommendation for one Jersey if he had to bring two Shorthorns to the show to feed her. So if the average dairyman bestowed the care on his ordinary cows that he bestows on his particular Jersey or Ayrshire, I think he would get almost as good results, and, perhaps, in some cases, even better. With regard to the remarks that have been made on the subject of the cleanliness observed in Denmark, I may say that I personally do not know much about the habits of the Danes. I know this, however, that they are very jealous with regard to their reputation, and that nothing goes out of Denmark that is not up to the mark. I believe I have made as much "Danish" butter as any man in Denmark—that is, in one season; but I made it in Sydney under the supervision of a Dane, who bought the butter in Sydney, sent it to Denmark, and had it reshipped from there to London. But I give the Danes credit for one thing, and that is, they examine every pound of butter that went into the Danish firkins. They have now a reputation which is made not from Danish butter alone, but from butter selected from the whole world. In 1901 as much "Golden Churn" butter went from Queensland, in proportion to the dairying done here, as there was from Victoria, where the "Golden Churn" butter is one of the leading brands. The Golden Churn people pay ¼d. a lb. more for the butter put up in "Golden Churn" boxes, with the result that "Golden Churn" butter has a name in South Africa and in London, which results in its commanding 1d. a lb. more than the usual market rate. So there is something in method and cleanliness. With reference to the coagulation of milk while still sweet, I may say that milk is very subject to micro-organisms which set to work in milk very rapidly. Thunder has nothing to do with it. It is the closeness of the atmosphere during the thundery weather that is beneficial to the development of certain bacteria which cause coagulation in milk. What we look for in putting starters into milk is, to put a starter in that will make the milk sugar in the milk set up an acetic reaction, instead of an alkiline reaction. It is the latter which we dread. The alkaline reaction will go on acting and reacting till it destroys the whole product. The acetic reaction is what we want. To the question, "Will the constant milking of cattle improve their milking qualities?" I say, yes. The constant milking of cattle, one generation after another, brings out that particular trait in their character. We heard yesterday how the orange was evolved from a poisonous berry, and I say it is possible for mind to triumph over matter in connection with improving the milking qualities of our cattle. With reference to Shorthorn cattle, you will, of course, please yourself about the particular breed you intend to go in for, but some of you may be going South to buy bulls, and to them I wish to point out one defect they may look forward to in the Shorthorn. We have all the diseases over there that generally affect cattle, and they can hardly be avoided, for they will break out among your herds in spite of you. But there is one particular deformity that can be avoided, and that is what is called "pigmouth" or "parrot-jaw." It is a very serious defect in cattle, although it is simply a matter of the lower jaw being shorter than the upper. If beasts are feeding and reach their necks well out from them to gather their food, then do not take those beasts. If on the contrary they feed straight down, put their heads straight down, and nip the grass off with their jaws, then you can depend they have not developed this "pig-mouth." Cattle with "pig-mouth" cannot stand drought, for they are poor feeders. There is no necessity to get them if you are careful to look at what you are buying. But people do get hold of them sometimes, the more especially when they are buying calves. In getting a cow the great thing is to get a good feeder, and do not buy a cow that is not one. If you have to strike a drought with pig-jawed cattle, you will find that you will lose the whole of them.

THE TEACHING OF AGRICULTURE IN STATE SCHOOLS.

Mr. H. A. TARDENT (Toowoomba): You are aware that there is a tendency among the young people of the country to leave the land and congregate in the towns, and I consider everything that is possible should be done to check that tendency. One reason for the trouble is, that we do not make country life sufficiently attractive; and another is, that our system of education, which is excellent in many ways, is a little too bookish. It is for that reason that I think the object lessons taught at State schools should be taken more advantage of. I know that great use is made of them in certain isolated cases, but I am bringing the matter before the Conference with the idea of trying to make the system more general. I accordingly beg to move that this Conference suggest to the Minister for Education the desirability of recommending school teachers, especially those residing in country districts, to use as much as possible object lessons for the purpose of acquainting pupils with elementary agricultural science; when practicable to institute experiments in a small scale in school grounds; and to encourage pupils in the collecting of specimens of natural and agricultural products to be displayed in the school rooms.

The motion was formally seconded.

Mr. W. DEACON (Allora): Personally I have a great objection to the overloading of the subjects in our school curriculum. Where a teacher takes an interest in agriculture, and is well acquainted with the subject, then it may be all right for him to treat of agriculture when the time for the object lesson comes round. But there are plenty of teachers who could not teach agriculture, and if you want to teach a boy arithmetic you get for him a man who knows something about arithmetic. If you are going in for this subject of teaching agriculture in State schools, you must first of all instruct the instructors. As for teaching being bookish, I do not think you can make that charge against our schools. The principal subjects the teacher has to teach are the elements, for children go to school not to acquire knowledge, but to get the means of acquiring it. You have got to teach them reading, writing, and arithmetic, for there is a vast gulf between the man who can read and write and the man who cannot. To know a little about agriculture would undoubtedly be a very nice thing for hundreds of men, but so would a knowledge of mechanics and plenty of other things, and, after all, if a man is not going to be a farmer, one might be inclined to question the wisdom of spending in teaching agriculture time that might profitably be devoted to something else. Technical agriculture should be taught, however, in every technical school in agricultural districts. But as for loading the curriculum of our primary schools, the only answer is that it is loaded too much already. Whatever we do, do not let us cram our youngsters.

Mr. F. W. PEEK (Chamber of Agriculture) stated that he would like to see our teachers appealing in their instruction more to their pupils' powers of observation than to their memories.

Mr. C. P. MAU stated that the lessons on agriculture that he had learned at school in Denmark had stuck to him to this day, and he hoped that if possible something would be done to see if agriculture could not be taught in some shape or form in the schools in the farming districts of Queensland.

Mr. W. FIELDING, of Redland Bay, deplored the tendency of the times for population to become concentrated in large cities, and was glad that Mr. Tardent had had the courage to bring the matter up. He was of opinion, however, that the young men of the country drifted to the towns because they considered they would get better pay, easier work, and more luxuries there.

Mr. H. A. TARDENT stated that he had had his share of experience in teaching, and he considered such subjects as entomology, botany, and the like could easily be made subjects of interest to boys. He would advise anyone who happened to be in the Toowoomba district to go to the Westbrook Reformatory, for it was really wonderful to see the work that the Superintendent, Mr. Richmond, did there in the way of combining agriculture with the ordinary system of education. In conclusion, Mr. Tardent was sure that, if the State school teachers were to make use of the articles written by Mr. Boyd for the *Agricultural Journal* on the "First Steps in the Principles of Agriculture," results would accrue of advantage to the State, both materially and morally.

The Chairman: It must be remembered that the schools of the State are primary schools, and while I dare say it is desirable, as Mr. Tardent says, that boys should be instructed in entomology, botany, and a variety of other subjects, there is an old saying that a vessel can only hold a certain quantity. There is, I think, a certain period in the life of school children when their time is much more profitably spent in learning reading, writing, and arithmetic than in trying to acquire a knowledge of subjects which their minds are not able to master. Even in such comparatively advanced centres of education as the Mining School at Charters Towers or the Agricultural College at Gatton, one of the difficulties the principals have to contend against is, that the boys who go there are not sufficiently well grounded in elementary subjects to profitably take up the instruction that is given them. The Education Department has often had the reproach thrown at it that there are too many subjects crowded into the short time which can be spent by children at school. You can go and take an acre of ground, and plant it with certain crops, be they cabbages, maize, or fruit trees. If, however, you try to get too much from the acre you will end by getting nothing at all, and that is a principle that holds good with school children. The Education Department has got in its service men who have passed the whole of their lives as pedagogues. The Under Secretary, the Chief Inspector, and all the other inspectors are old and trained teachers, and these questions occupy, naturally and properly, their minds. They do the best they can with the time which is at the command of the pupils who go to the schools. But we must not make the mistake of trying to crowd into a small child's mind too many subjects, for in endeavouring to do so we are doing evil and not good. I have to remark that Mr. Tardent's zeal is eminently creditable to him. But the Agricultural Department and the Education Department had a consultation together some time before Mr. Tardent appeared on the scene. As a matter of fact, in addition to the other subjects which children have to deal with at school, so much time of the schedule is devoted to object lessons—that is, lessons on things and not on words. That is a part of the curriculum already; and with regard to Mr. Tardent's suggestion that school children should be led to take an interest in agriculture, I may say that is going on at present. In a number of schools in the agricultural districts of the colony the teachers are instructed to use the time which is set aside for object lessons in giving lessons on agriculture. That is being done on the Darling Downs, and, further, in mining districts instructions have been given that an endeavour should be made to interest the children in minerals and metals. So far as the time at the disposal of the teachers and the ability of the children to learn will permit, what I understand Mr. Tardent wants to be done and wants this Conference to ask to be done, is, fortunately, already being done. We have no objection whatever to the idea, and every opportunity to take advantage of the limited time which is at the disposal of the children of the colony is, to my mind, already being taken. This is a very interesting topic, interesting both to the Department of Agriculture and to the Department of Public Instruction; and they are both doing their best, with the means at their command, to further agricultural education. In agricultural districts, object lessons are being devoted to agriculture; and the classes are, I understand, conducted with the object of leading the children to take a healthy interest in what they see. If you like, I shall read the resolution and put it, but I think it is superfluous. If you pass it, I shall take it that you are not passing approval of Mr. Tardent's motion, but of what is already being done by the Department of Public Instruction.

In accordance with the Chairman's suggestion, Mr. Tardent's motion was slightly amended, and was passed as follows:—"That the Conference is pleased to note that the Education Department had recommended school teachers, especially those residing in country districts, to use, as much as possible, object lessons for the purpose of acquainting pupils with elementary agricultural science; to institute, where practicable, experiments in a small scale in school grounds; and to encourage pupils in the collecting of specimens of natural and agricultural products to be displayed in the school rooms."

RESOLUTIONS.

The following recommendations and resolutions, submitted by the Committee of Resolutions, were all unanimously adopted by the Conference:—

EXPERT IN BACON-CURING.

Having considered the paper read by Mr. W. S. Palmer, this committee decide not to make any recommendation in reference to the appointment of an expert in bacon-curing.

MOTOR CARS.

Having considered the subject submitted by Mr. J. T. Bell, M.L.A., the committee are of opinion that the utility of motor cars for the carriage of heavy goods has been thoroughly demonstrated, and they recommend the Government to purchase two of these vehicles to be used as feeders for the railways in agricultural districts.

TRAMWAYS.

Having read the paper by Mr. Lindsay, the committee are of opinion that Parliament having empowered local authorities to construct tramways and light railways, the Conference should recommend the Government to afford every possible facility for the development of agricultural districts by the construction of such lines.

COUNTRY ROADS.

Having considered Mr. Thynne's paper, we are of opinion that the suggestion contained therein—that a combination of a number of shire councils for the purpose of securing a competent engineer to advise in the construction of roads and bridges—is worthy of the consideration of shire councils, and that a copy of this resolution be forwarded by the Department of Agriculture to the clerk of each shire council in the State.

HORSE-BREEDING.

Having considered the paper read by Mr. Dallon, we cannot recommend the establishment of stud farms by the Government for the breeding of horses, but we recommend that the opinion of the different agricultural societies be ascertained as to the imposition of a tax on stallions.

ROADS ON REPURCHASED ESTATES.

Having duly considered Mr. McCartney's paper, we recommend that a copy of it be forwarded to the Secretary for Public Lands for his consideration

AMENDMENT TO AGRICULTURAL BANK ACT.

Having duly considered Mr. Fox's paper, we strongly recommend that, failing the Government introducing an amendment to the Advances to Settlers Act, they give their support to the amended Bill as submitted by Mr. Fox.

ANGORA GOATS.

Having duly considered Mr. Robinson's paper, and believing the growth of mohair to be an important factor in the development of the industry of the State, we recommend that the Government be requested to give every facility for the introduction of Angora goats, but we cannot recommend the formation of a herd of Angora goats by the State.

Agricultural Interests affecting the Small Farmer and Producer.

That, having considered Mr. Peek's paper, we desire to place on record our appreciation of it, but cannot make any recommendation.

Tanning Materials.

That, having considered Mr. Turner's paper, we recognise the benefit that would be conferred on the trade and commerce of this State by converting the hides, now being exported, into leather; and towards that end we recommend the Government to encourage the making of tanning extract and the growth of tanning material.

Bulls for Dairying Purposes.

That, having considered Mr. Dean's paper, we recommend the adoption of the principles of co-operation on the part of groups of dairymen in the purchase of suitable bulls, and that the Department of Agriculture be requested to afford information as to where such animals can be purchased.

Dairy Supervision Bill.

Having carefully considered the paper read by Mr. Sinclair, we heartily recommend its teachings to the earnest thought of dairymen, and request that the Government take the necessary action to introduce a Dairy Supervision Bill, to be administered by the Department of Agriculture.

In addition to the foregoing, which were submitted by the Resolutions Committee, the following were also adopted :—

Swine Fever.

That thanks be accorded to the Department of Agriculture for the prompt action it took in endeavouring to stamp out swine fever, and that it is hoped they will continue their energies in the matter.

That the restriction on pigs coming from New South Wales be continued for six months longer.

Mr. Clement L. Wragge.

That in the opinion of this Conference the removal of Mr. Clement L. Wragge, late Government Meteorologist, is a severe loss to the agriculturists, not only of this State, but of the Commonwealth.

CONCLUSION.

On the motion of Mr. W. D. Lamb, a vote of thanks was passed with acclamation to the Wide Bay and Burnett Pastoral and Agricultural Society, to the Mayor and Aldermen of Maryborough, to the Chamber of Commerce and the School of Arts, for the excellent arrangements made for affording facilities for the delegates to see the places of interest in the town and district and also for the hospitable entertainment provided.

Mr. Sinclair proposed and Mr. Hayes seconded a vote of thanks to the Chairman, which was duly carried.

Mr. Dalrymple, in reply, said: I am very much indebted to you for the gracious acknowledgment you have been pleased to make of any little services that I could render, and I take it that, in this vote of thanks that you have conveyed to me, my friend Mr. McLean is also included. He is a very indispensable part of the machinery, and takes, as you know, an honest and earnest interest in the success of the Conference. I have to thank you for many things. I have to thank you particularly for the circumstance that you have made the chairmanship of this meeting a task not of difficulty, but of the greatest ease and the utmost pleasure. I have had no difficulty whatever. They say comparisons are odious, but of the three Conferences I have attended I must say that none of them has surpassed this in any respect whatever. The papers have been admirable and very helpful. The remarks which have been made by the speakers (I do not wish to be invidious or I should mention some gentlemen's names)—have been of a most helpful nature. We have dealt with dairying, swine, bulls, co-operation, with improvement in the means of transport, and last, but not least, with the Angora goat. I think the Conference and the members of the agricultural associations may be congratulated upon the success of the representatives, upon their attention, and upon the pleasant manner and industrious way in which they have all worked together. I think you will quite agree with Mr. Sinclair that, if there are persons in the State who are under the impression that the business of the Conference is all beer and skittles, they are very much mistaken; and that the members of the Conference all recognise that they have an earnest practical duty to perform, and that they do perform it. I think the Conference has been very successful, and I believe sincerely that meetings of this kind do undoubtedly result in a distinct gain to the agriculturists of the State, and necessarily also to the Department and to the State. I thank you exceedingly for the acknowledgment that you have given for anything I have done, and I can assure you that I thoroughly appreciate the honour of being here. I am delighted to find that the Conference, so far as the work is concerned, has gone off in an entirely satisfactory manner. Of that the members may well be proud, and I am sure that most of them will remember, as an agreeable incident in their lives, the time they have spent here not only pleasurably, but also usefully.

Mr. A. W. Cameron, the President of the Wide Bay and Burnett Pastoral and Agricultural Society, replied to the vote of thanks moved by Mr. Lamb; and a vote of thanks to the Press, suitably acknowledged by Mr. Chaplin, of the *Queenslander*, finished the session.

The Agricultural Conference of 1903 was brought to a final conclusion by a smoke concert, given in honour of the delegates by the Wide Bay and Burnett Pastoral and Agricultural Society the same evening, although about fifty delegates were the guests of the Mayor and Aldermen of Maryborough at the Biggenden Show on the following day. This latter outing was greatly appreciated by the delegates. The possibilities of the district were a source of surprise to many who had been previously unacquainted with it, and an enjoyable and profitable day was spent in inspecting the show, which was a splendid one, and, under the guidance of the manager, Mr. Brooks, the Biggenden State Farm.

Agricultural Patents.

PATENTS ACCEPTED.

7041: Jonathan Harris, of 550 East Madison Avenue, city of Cleveland, county of Cuyahoga, U. S. America, machinist. "Improvements in Wire Fences." Dated 29th December, 1902.

7022: Thomas Robertson, of Mount Mitchell, Ballarat, Victoria, grazier. "An Improved Method of and Means for Killing Rabbits by Poisoning." Dated 15th December, 1902.

7311: Alexander Anderson, of 45 Adelaide street, Brisbane, Queensland, patent agent (communicated by *Alfred Pfaff*, of No. 375 Collins street, Melbourne, Victoria, Australia, accountant). "Method of, or Process for, and Chemicals to be used in the Treatment of Eggs for Preserving same." Dated 8th June, 1903.

Statistics.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE TOTAL RAINFALL FOR EACH MONTH OF THE YEAR IN THE AGRICULTURAL DISTRICTS OF QUEENSLAND.

STATIONS.	1902.							1903.					
	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April.	May.	June.
North.													
Bowen	0·44	0·11	0·02	Nil.	0·06	0·06	3·16	1·66	7·65	16·44	1·44	2·04	2·77
Cairns	4·97	3·87	0·95	Nil.	0·16	1·38	5·15	21·32	10·28	32·51	15·50	1·67	0·51
Geraldton	8·10	7·32	1·77	Nil.	0·29	0·44	5·53	38·94	17·24	45·00	14·03	7·46	3·42
Herberton	1·58	2·05	0·08	Nil.	0·93	1·13	7·02	6·88	3·69	20·80	12·04	0·64	1·00
Hughenden	Nil.	Nil.	Nil.	Nil.	0·05	0·22	2·77	1·52	0·99	0·95	0·81	1·73	Nil.
Kamerunga	5·12	4·00	0·81	Nil.	0·29	1·57	3·79	20·36	10·82	37·45	19·32	2·14	0·50
Longreach	Nil.	Nil.	0·05	Nil.	Nil.	1·27	1·56	1·81	0·09	3·48	Nil.	3·51	Nil.
Lucinda	0·63	0·21	0·45	Nil.	0·22	0·10	2·47	17·43	11·66	44·24	6·44	6·36	2·44
Mackay	2·33	0·59	0·80	Nil.	0·17	0·35	7·71	10·45	6·47	13·51	1·50	6·75	2·49
Rockhampton	Nil.	Nil.	0·09	1·41	0·05	0·51	5·60	0·92	1·68	3·73	1·12	6·93	0·08
Townsville	0·10	Nil.	0·10	Nil.	0·29	0·08	6·50	4·66	8·11	19·80	1·61	2·08	1·02
South.													
Barcaldine	Nil.	Nil.	0·08	0·02	0·21	0·95	6·41	3·73	0·40	0·94	Nil.	4·92	Nil.
Beenleigh	0·11	0·62	0·49	0·28	2·92	3·36	1·83	1·88	4·77	6·49	1·90	12·40	0·92
Biggenden	0·04	0·08	0·04	1·58	2·34	0·25	8·98	2·25	3·15	3·95	0·16	1·28	2·07
Blackall	0·01	0·01	0·21	0·27	0·12	1·05	4 61	3·04	1·50	3·87	Nil.	5·19	Nil.
Brisbane	0·06	0·55	0·98	1·30	3·42	2·59	1·82	1·31	5·35	4·79	1·33	11·82	0·73
Bundaberg	Nil.	0·07	0·13	0·31	1·24	0·65	1·38	0·97	2·60	6·05	0·38	11·55	0·33
Caboolture	0·03	0·20	0·05	1·09	2·30	3·17	1·74	5·15	3·42	9·59	1·39	16·14	0·92
Charleville	0·12	Nil.	1·04	0·30	1·05	2·14	4·79	1·70	0·43	2·94	1·06	2·94	0·02
Dalby	0·15	Nil.	0·41	0·70	3·14	2·79	3·29	1·28	1·22	4·89	1·33	6·00	0·03
Emerald	0·01	Nil.	Nil.	0·02	0·01	1·58	8·42	2·30	2·49	1·48	0·26	3·43	0·02
Esk	0·04	0·25	0·15	0·64	0·93	4·00	7·67	1·32	3·51	4·46	1·25	9·27	0·30
Gatton College ...	0·03	0·04	0·64	0·73	2·41	3·72	5·14	3·68	3·81	2·60	0·79	7·55	0·17
Gayndah	Nil.	Nil.	0·05	0·64	2·10	2·08	3·37	0·77	2·08	2·30	0·09	6·03	0·05
Gindie	Nil.	Nil.	Nil.	0·10	Nil.	1·65	7·14	1·43	3·15	0·49	0·19	3·31	Nil.
Goondiwindi	0·41	Nil.	1·19	0·21	1·50	0·89	2·21	1·84	0·72	4·40	1·73	5·07	0·15
Gympie	Nil.	0·36	0·94	1·38	3·80	1·40	4·32	2·40	3·27	5·96	1·28	10·20	0·62
Ipswich	0·15	0·31	0·77	0·30	2·86	3·45	1·84	1·36	5·55	3·79	2·24	9·56	0·85
Laidley	0·06	Nil.	0·40	0·89	2·21	3·27	5·13	0·71	3·63	2·63	0·95	8·20	0·20
Maryborough	0·24	0·29	0·57	0·69	0·91	1·11	4·02	2·09	2·76	3·23	0·66	9·58	1·60
Nambour	0·04	*	0·70	0·35	1·26	1·66	2·64	2·53	5·03	5·18	0·83	19·46	1·29
Nerang	0·52	1·07	1·22	1·17	3·15	1·75	1·73	3·36	4·73	4·84	3·04	15·75	2·36
Roma	0·20	Nil.	0·46	0·35	0·92	0·86	2·35	0·75	0·15	2·48	0·39	3·17	0·34
Stanthorpe	0·78	0·15	0·94	0·95	2·29	3·98	1·75	0·23	1·59	0·95	1·18	6·87	0·74
Tambo	0·01	Nil.	0·28	0·06	0·41	1·34	4·14	2·43	0·15	4·73	0·02	1·96	0·01
Taroom	Nil.	Nil.	0·17	0·45	0·68	1·40	2·88	4·32	1·53	1·29	0·82	8·83	0·23
Tewantin	0·91	0·91	0·85	0·87	1·94	1·96	1·35	1·90	5·30	11·52	1·80	20·22	7·42
Texas	0·88	Nil.	1·57	0·13	2·42	1·67	1·42	0·18	0·94	0·48	1·84	4·34	0·36
Toowoomba	0·38	0·19	0·56	0·37	3·07	3·18	6·99	2·21	3·42	3·60	1·27	7·94	0·34
Warwick	0·63	0·20	0·94	0·43	2·96	2·87	4·61	0·68	2·59	2·13	0·73	8·62	0 10
Westbrook	0·28	0·06	0·29	0·38	3·20	3·34	3·37	4·21	2·70	1·52	0·34	4·23	2·53

EDGAR L. FOWLES,
For the Hydraulic Engineer.

Entomology.

NUT GRASS DESTROYING INSECT.

Early in May of the present year it was brought under the notice of the Department of Agriculture that in the Singleton district of New South Wales that the notorious weed, nut grass, was dying through the attacks of an insect parasite. Subsequently the same incident was referred to in the local Press, the particular insect concerned being denominated a "coccid" of the "free moving class." At the same time, it was stated that nut-grass plants on which the insect occurred were being disseminated, in order to secure its establishment and consequent co-operation in exterminating the weed named in localities remote from that in which the so-called "coccid" had been discovered. More recently parcels of such plants have not only been placed under offer on certain terms to residents of different agricultural districts of Queensland, but have also in some cases been already dispatched to them; and this by or under the auspices of the Department of Agriculture of New South Wales.

The Queensland Government Entomologist had, however, anticipated the arrival of such consignments, and had taken steps in accordance with the provisions of "*The Diseases in Plants Act of* 1896" to intercept them, it being in his opinion essential to ascertain, before admission, not only the generic and specific identity of the insect, but also the degree of probability of its attacking other plants than the one for whose destruction its introduction was being aimed at. Opportunity has thus been afforded him for examining examples of the insect in question, and it has been found that they present in every detail the structural features assigned to a European insect named *Antonina purpurea*, agreeing in every particular with the description of this published by the great French specialist, V. Signoret.

However, the identity between the European and Australian insects cannot be positively established until examples of both are secured and most carefully compared—a work that will necessarily occupy some little time. Meanwhile it has been officially announced in New South Wales that the Singleton insect has been, so far, found to be exclusively associated with nut grass; but since—as Mr. Tryon points out—no young are produced during the winter season, and it can alone spontaneously migrate from its host plant as a larva, such freedom of occurrence on plants recently established in its vicinity may for the time being be expected. But should the identity of the European and Australian insect be found to obtain—as seems most probable—it may with reason be anticipated that the exclusive attention of the latter to nut grass will not hereafter characterise its habits, since the former insect—*Antonina purpurea*—is a coccid that in its native home is injurious to several members of the great family of grasses—one that includes plants whose cultivation constitutes some of our most important primary industries.

Until, therefore, the question raised has been definitely disposed of, it would be most injudicious to establish this nut-grass destroying insect in our State, and agriculturists are advised to forebear meanwhile from taking any steps that would tend to accomplish this result.

A fuller account will appear in the next issue of the *Journal.*

Answers to Correspondents.

TO ROUGHLY ASCERTAIN THE COMPOSITION OF SOILS.

Rasos, Bowen.—We have several times lately been asked to give some method of finding approximately the constituents of a soil when no chemist is available. This we have not been able to do, because scientific men, who understand the difficulties connected with making an accurate soil analysis, do not consider that there is any rough and ready method which would be at all available.

Semler, in his work on "Tropische Agrikultur," Vol. I., 1897, writes on this method of soil analysis:—Whoever wishes to take up a piece of virgin land should be capable of making a soil examination by separating the fine and slimy parts from the coarser particles by means of washing with water. Such examination would not by any means render a chemical analysis superfluous. Still, by this washing process, the presence of some of the most important soil constituents and an approximate idea of their quantitative proportions may be ascertained, and thus some fairly reliable conclusion as to the fertility of the soil becomes possible. The materials required are: A few wine glasses, a small pestle and mortar, a piece of litmus paper, a small scale, a small bottle of muriatic acid, another of ammonia, another of oxalic acid mixed with water, a fourth of phosphate of ammonia and of soda, and some filter paper, all of which may be bought at any chemist's shop.

Suppose it be desired to try if a soil contains sand and clay. Take 50 grammes of the soil (15·43 gr. Troy = 1 gramme) or 32·14 dwt. Grind it well in the mortar, having wetted it first, until it is reduced to a soft pasty mass. Now dip a piece of litmus paper into it. If this turns red, there is a proof that it contains humic acid, and hence that drainage is required or that lime should be applied. Now pour the thick liquid into a tall funnel, reduce it largely with water and carefully wash out the mortar, emptying what remains in it into the funnel. If it be then allowed to stand for a little time, the various constituents will sink to the bottom of the glass according to their specific gravity and their degree of division into particles. The coarse sand sinks first, then the fine sand, followed by the clay, and if humus be present this will form the upper layer. From the depth of the layers a fairly safe conclusion may be arrived at as regards the proportional quantity of each constituent contained in the soil. To continue the examination, stir up the sediment, and in a few minutes pour the cloudy liquor into another glass, being careful not to allow the sand, which will have meanwhile again sunk to the bottom, to flow off. The residue must be mixed with water, stirred, and, as in the first instance, be poured out. Continue this process until, apparently, nothing is left in the first glass but sand. To prevent any moisture running down the edge of the glass, smear a little grease on the outside or hold a bit of wood against the spot where it runs off. Now dry the sand on filter paper and then weigh it. What it falls short of 50 grammes will be put to the account of fine soil (clay and humus).

The examination for the lime and magnesia content proceeds as follows:—Weigh off 20 grammes of the dry soil, pour it into a small bottle, and add six times as much water; then add gradually from 5 to 10 grammes of muriatic acid, and put away for several hours in a warm place. If, when the muriatic acid is added, a distinct buzzing sound is heard, this is a proof that the soil is rich in lime. When the contents of the bottle have become perfectly settled, pour them on to filter paper, and add the washings of the bottle as well. The yellow liquid filtered through, which must, of course, be caught in a glass, must be mixed with ammonia until it distinctly smells of it. If brown flakes separate themselves in it, these will be oxyhyrate of iron and hydrate of alumina (with phosphoric acid). The liquid must again be filtered, and, in its liquid state, must be mixed with a solution of oxalic acid and water, so long as any cloudiness arising from oxalate of lime appears. Note must be taken, if during this process the smell of ammonia disappears; should this happen, the smell must be restored by the addition of more ammonia. The lime content may be ascertained by the quantity of precipitation; but if a more accurate calculation of the quantity is required, the liquid must be poured on to a dry piece of filterpaper, which has to be accurately weighed; the precipitated matter on the paper must then be washed and dried near the fire. Then both paper and precipitate are weighed, and the gain in weight is taken as the oxalate of lime. By heating it is changed into carbonate of lime, but this process is not needed, since we know that 100 parts of lime are equal to 63⅓ parts of carbonate of lime.

The magnesia is not taken into consideration in the preceding process. Its content can be ascertained from the liquid filtered from the oxalate of lime, to which a little ammonia is added. Then a little phosphate of ammonia is dissolved in it, and it is stirred with a glass rod. After a short interval, if there is a large percentage of magnesia, a crystalline sediment results, which consists of ammoniac phosphated magnesia. If the percentage of magnesia is small, there will be little precipitate, and that only after standing for a long time.

It is important to examine into the moisture-holding power of the soil. For this purpose, weigh 100 grammes of dry earth, pound it fine in the mortar and empty into a glass, the weight of which, together with its contents, must be ascertained. Then pour so much water into the glass as will completely cover the soil, and which it cannot be expected to completely absorb. In twenty-four hours the superfluous water must be carefully poured off and the glass again weighed. The additional weight gives the percentage of water which the soil can take up. This power of water absorption reaches, in the cases of clay and humus, to 80 and 100 per cent. In the case of gravel and sand, it falls to 20 and 25 per cent.

Mr. Semler recommends that these experiments should be made during dry weather, as the appearance of many soils is at such a season very deceptive. But experiments should be made both during a dry and a wet season.

EGGS FOR HATCHING.

SUBSCRIBER, AMATEUR, Albion.—

1. Mr. J. Beard, Queen street, will hatch out your eggs in his incubators after the Exhibition in August. Write to him.

2. Eggs for sale are not yet ready at the Agricultural College. Write to the Principal stating your requirements.

STILTON CHEESE.—HAND WHEAT MILL.

AITCH AITCH, Kirchheim.—

1. Mr. John Mahon, Principal of the Queensland Agricultural College, some time ago, described in brief the method of making Stilton cheese, which we give you. As soon as possible, an article dealing more fully with the matter will be published in the *Journal*. The demand for this class of cheese is very limited in the Australian colonies. The flavour is an acquired one, and foreign to many. Stilton is made from morning's milk, to which cream is added in the proportion of 1 quart to every 10 quarts of milk. The milk and cream should be thoroughly mixed and coagulated in the same manner as in the manufacture of ordinary cheese. No heat except the natural heat is applied. When coagulation is completed, the curd is cut into checks and allowed to stand for 30 or 40 minutes (the vat or tub should be lined with fine cheese-cloth, which aids in the removal of the curd); it is then removed to a basket and allowed to drain. After the whey is separated from the curd, it is carefully placed in hoops or moulds, and turned four or five times during the day. No pressure is needed except its own weight, and it is allowed to remain in the hoop without cloth or bandage and until sufficiently consolidated to hold together. The

cheese is then removed and a bandage pinned around it, and placed on a shelf to cure. The mould used is of the ordinary loaf size, but should be perforated with small holes and have a perforated follower (or lid) on top and bottom to allow the whey to escape. No salt is used in the curd, but is applied from the outside after the cheese is removed from the hoop. The cheese is cured at a temperature of about 70 degrees Fahr., when a blue mould develops, which is characteristic of this class of cheese. If the cheese becomes dry, wash several times in soft water and then place in a cloth moistened with brine or vinegar, when it will gradually become soft and mellow. This method is adopted in Switzerland, where cheese is kept for years.

2. You can obtain a hand-power wheat-mill, which will grind sufficient wheat for the daily needs of a family, at Messrs. Perry Bros., Queen street, Brisbane. Price, 37s. 6d.

DODDER IN LUCERNE.

W. B. Jeffs, Yaamba road, Rockhampton.—The following method of getting rid of dodder is recommended by Mr. J. Whitely, Wycarbah (*see Journal*, 1st May, 1901):—The patches affected, as soon as discovered, were cut as close to thė ground as possible, and every particle of dodder and affected lucerne was removed and destroyed by fire. The place was then covered with a heavy mulch (say 4 to 6 inches) of dry grass. This effectually chokes the dodder, but the lucerne will grow through it. When required to be mown, the mulch should be removed to prevent entanglement in the machine. It is not at all necessary to dig out the lucerne plants. Mr. Whitely's lucerne was badly affected at one time, but he quite got rid of the dodder by this plan, and has not seen a trace of it for several years.

ARTIFICIAL AND STABLE MANURES.

Farmer, Toowoomba.—

1. Nitrate of soda is quicker acting than sulphate of ammonia, but the value of either manure depends greatly on the crop, climate, and the nature of the soil.

The crops most benefited by nitrate of soda are, according to Stutzer :

1st. All straw-growing plants.
2nd. Rape, mustard, &c.
3rd. Fodder and sugar beets and potatoes.
4th. Meadow grasses.
5th. Peas, vetches, clover, &c.

In the case of barley, it is found that sulphate of ammonia improves, and that nitrate of soda injures the malting quality of the barley, whereas if grown as a green fodder with the aid of the nitrate a higher feeding value is attained. Nitrate of soda is particularly more efficacious in very dry weather than sulphate of ammonia.

2. Both nitrate of soda and sulphate of ammonia are applied as top dressings when plants are well above the ground, and there is no danger of loss by exposure to atmosphere and sun.

3. The composition of farmyard or stable manure varies considerably, and its value is influenced by various causes—

Analysis of Stable Manure in percentage.	Fresh.	Well Rotted.
Water	71·00 ...	79·00
Organic matter	24·60 ...	14·50
Nitrogen	·45 ...	·58
Potash	·52 ...	·50
Phosphoric acid	·21 ...	·30

Potato vines contain on an average about 49 per cent. of nitrogen, and the tubers 34 per cent. of nitrogen, so that an 8-ton crop would take about 60 lb. of nitrogen from the soil.

RHUBARB, TOMATOES, ETC.

ADAM REID, Nanango—

1. Rhubarb should succeed well with you. It requires deep rich soil. The wholesale market price ranges from 2d. to 6d. per bundle.

2. Tomato plants may be, and always are, transplanted from the seed bed, but not when they are bearing. You may layer them, and the long stems will take root.

3. Caponising instruments may be obtained from Mr. J. Cribb, Milton, Brisbane. Price, about 10s. 6d. the set.

4. The seed of the self-sown sunflower may germinate all right, but it would be advisable to procure fresh seed.

5. Use bi-sulphide of carbon in the manner recommended in this *Journal* (Vol. XI., p. 379, Nov., 1902).

6. If the frost is severe, the grain will be shrivelled if not ripe.

KAFIR CORN.

F.A.B., Nanango.—

1. A bushel of Kafir corn weighs 56 lb.

2. The flour-mills do not buy Kafir corn for any purpose.

3. The value per bushel is that given for seed purposes.

SUGAR-CANE FOR PIGS.

FREDK. FORD, Cooran.—

1. Sugar-cane is excellent food for pigs and other animals. It is not injurious to them.

2. Pigs will fatten on it.

3. Chaffed cane mixed with molasses will fatten horses and give them a glossy coat.

CULTIVATING A HILL SIDE WITH SISAL HEMP—CASSAVA—POTATO FLY AND GRUB.

F. Z. R.—

1. Sisal hemp would grow well with you on the hill side. If the land is very steep, cultivation will result in the soil washing down to the low land. As the sisal plant does not absolutely need cultivation, it would hold the soil together. Otherwise it would be better to lay down permanent pasture grass.

CASSAVA.

2. We would not advise the planting of cassava on land thus situated.

3. Your request for plants will receive attention.

POTATO FLY AND GRUB.

4. See notes by the Government Entomologist on the subject.

GALVANISED WIRE FOR VINE TRELLISES—WHITE ANTS DESTROYING LIVING VINES.

J. BUNNAGE, Gracemere.—

1. Lightning will not affect vines trellised with galvanised wire more than if trellised with black wire.

2. White ants will make their way from dead into living wood very frequently in time of drought.

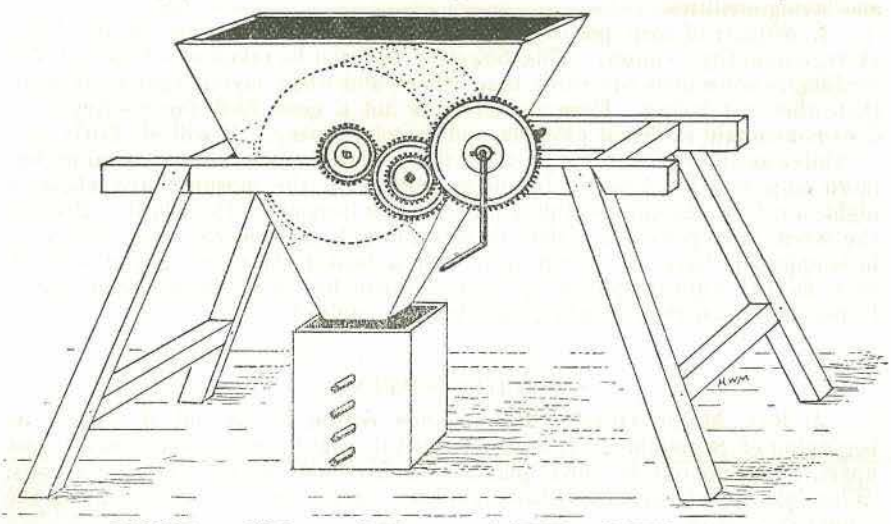
ROAD THROUGH A SELECTION.

ANXIOUS.—The matter referred to in your letter is one which should be laid before the Lands Department, or a lawyer should be consulted. We can only deal with with matters concerning agriculture, stock, &c.

PEARL TAPIOCA AND SAGO.

P. Cochrane, Ayton, Cooktown.—Tapioca and starch are made from the cassava root, but sago is derived from the sago palm (*Cycas circinalis*), and it is a misnomer to call the product of the cassava tuber sago. The manufacture of cassava starch is much the same as that of arrowroot. The roots are well washed, after being peeled, to get rid of as much of the poisonous principle as possible. If the roots are left for a couple of days in water, the skin comes away more easily. They are then passed through a grating machine. The starch and fibre pass from this into a cylinder or trough covered either with strong muslin or fine brass wire netting. Continuous streams of water are now poured upon the grated mass to separate the starch from the fibre. The starch, held in solution by the water, passes away into a lower receptacle consisting of a row of barrels or vats. The fibre, thoroughly cleaned of starch, is then removed from the cylinder, and either turned into manure or fed to stock, having, however, little feeding value.

After the starch has settled in the vats, the water is gradually drained off through a series of taps, one above the other. More water is now poured in, the starch is well stirred, and then again allowed to settle. This process is



carried on until the starch is perfectly white. It then remains in the vats until the surface is dry, when it is cut out in lumps and made ready for further operations. If tapioca is required, the lumps of starch must be thoroughly dried on airy shelves before they are placed on horizontal tin plates, beneath which is a hot-air pipe, in which a particularly gentle heat is maintained. In Europe, tapioca is usually sold in the form of flakes, which are made by placing the lumps of starch, in a nearly dry state, in deep pans where they are subjected to strong heat, and are continually stirred about until they have acquired the desired form. In the Straits Settlements "pearl tapioca" is made in the following manner:—

The dried masses of starch are placed in a hand mill, where they are reduced to the size of No. 4 shot. From the roof of the factory hangs a coarse cloth, like a veranda hanging mat or blind, kept spread out by a crosspiece of wood, so that it looks like a canvas boat. This cloth is filled with the shot-like starch, and it is then swung backwards and forwards by two men. Under this treatment the grains are ground into perfectly round little balls, which require to be once more warmed for half an hour by gentle heat in a pan, when the process is complete. In fine weather they are often exposed for half a day to the sun's heat.

PEANUTS—IMPROVED VARIETIES OF MAIZE.

LINCOLN, Chinchilla.—

1. Information concerning peanuts has already been supplied by letter.

2. So far as we know at present, the varieties of maize you mention are not obtainable in the State, but further inquiry will be made, and your request will be complied with in the event of any of them being procurable.

We have just been informed that some of the varieties of maize you require are obtainable at the State Farm, Westbrook. *See* Advertisement in this issue.

ALGERIAN OATS—POULTRY—SEED MAIZE.

INQUIRER, Tewantin.—

1. Algerian oats are not so liable to rust as other varieties.

2. Rust is generally brought about by excessive moisture in the soil, low-lying land, heavy rains, followed by hot days, &c. There is no preventive,

3. Minorca fowls: Never breed from brother and sister, for, although the progeny may not deteriorate in size, they will certainly deteriorate in stamina and laying qualities.

4. A quart of corn per day, or its equivalent, for ten hens is about the average quantity to allow. This, however, must not be taken as a fixed rule for feeding, as some hens eat more than others, and when laying they need more than when not laying. Corn, moreover, is not a good feed for poultry, as it does not contain sufficient proteids, and is too heating. It will do fairly well in winter as an evening feed, provided that pollard is given in the morning, but more eggs will be obtained by giving pollard in the morning and wheat if night; or, for a change, good plump heavy oats instead of the wheat. Even at the wheat is 20 per cent. higher in price, it will pay best for eggs. As your hens appear to have a good run, give half a feed in the morning, and as much grain as they will eat up clean at night. Maize has at all times a tendency to fatten, but much more so when the birds are confined.

COTTON-SOWING.

J. RAY, Mount Olive, Kilkivan.—Sow cotton at the end of August or beginning of September. If seed is plentiful, sow in continuous rows 4 feet apart, and thin out to three plants at 1 foot to 18 inches apart in the rows. When the plants are 12 inches high, take out two from each hill, leaving the strongest to grow.

ANTS.

J. FITZPATRICK, Murphy's Creek.—

The Red Ants referred to by this correspondent are, it is presumed, those large insects that by reason of their colour might be more appropriately styled Purple Ants, and that are technically designated *Iridomyrmex purpurascens* by way of emphasis of this opinion. They are the ants that occur in such numerous communities and form the large and conspicuous subterranean nests to which access is gained by their denizens through so many openings. Various methods for coping with the Purple Ants have been recommended and extolled, such as:—Poisoning with a compound composed of arsenic, soda, and molasses, covering the nest externally with lime, piling rubbish upon it and then igniting it, and many others. The one with which the writer is, however, familiar, and is generally successful, consists in the employment of the volatile fluid bisulphide of carbon. Three or four drachms or a tablespoonful of this chemical, should its use be decided upon, should be poured into the nest here and there through one of the natural inlets; or down holes that have been purposely made with a stake or crow bar, having in view its application; the total quantity necessary being regulated by the size of the formicary. The latter should then be promptly covered externally with wet sacking. The dense vapour arising from the carbon-bisulphide will now pass downwards, and also laterally, through the passages in the nest, and prove quickly fatal to such ants and their young that may occur therein. Since the Purple Ants are great foragers, and consequently wide roamers, and are for the most part diurnal in their habits, it is necessary, for the success of this procedure, that it be resorted to at night, or at such time—as, for instance, during very hot or wet weather—during which they are remaining at home. Mr. W. W. Froggatt advises supplementing the last-mentioned method by the following action:—Remove the bag—he writes—after two minutes and apply a lighted stick (6 feet) over each opening, when the ascending fumes will catch fire and burn right down to the bottom of the burrows, causing a small explosion and wrecking the interior of the nest.

Whilst submitting these directions it must be pointed out that the Purple Ants possess habits which under many circumstances should bespeak their preservation rather than their destruction; allusion being made in this statement to their voracious appetite for other insects, and to their eminent services as scavengers of animal substances. In a poultry yard, where recently hatched chickens exist to claim their attention, a nest of these insects is likely to prove inimical to the successful raising of stock.

Times of Sunrise and Sunset, 1903.

DATE.	MAY.		JUNE.		JULY.		AUGUST.	
	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1 ...	6·16	5·14	6·33	4·58	6·43	5·0	6·33	5·14
2 ...	6·17	5·13	6·33	4·58	6·43	5·0	6·32	5·15
3 ...	6·18	5·12	6·35	4·57	6·43	5·1	6·31	5·16
4 ...	6·18	5·12	6·35	4·57	6·43	5·1	6·30	5·17
5 ...	6·19	5·11	6·36	4·57	6·43	5·1	6·30	5·18
6 ...	6·19	5·10	6·36	4·57	6·43	5·1	6·30	5·18
7 ...	6·20	5·9	6·36	4·57	6·43	5·1	6·28	5·19
8 ...	6·21	5·8	6·37	4·57	6·43	5·2	6·27	5·19
9 ...	6·21	5·6	6·37	4·57	6·43	5·2	6·27	5·19
10 ...	6·22	5·6	6·38	4·57	6·43	5·3	6·26	5·20
11 ...	6·22	5·6	6·38	4·57	6·43	5·3	6·25	5·20
12 ...	6·23	5·5	6·38	4·57	6·43	5·4	6·24	5·21
13 ...	6·24	5·5	6·39	4·57	6·42	5·4	6·23	5·22
14 ...	6·25	5·4	6·39	4·57	6·41	5·5	6·23	5·23
15 ...	6·25	5·3	6·39	4·57	6·41	5·7	6·21	5·23
16 ...	6·25	5·3	6·39	4·57	6·41	5·7	6·21	5·23
17 ...	6·25	5·3	6·39	4·57	6·41	5·7	6·21	5·23
18 ...	6·26	5·2	6·40	4·58	6·41	5·7	6·20	5·24
19 ...	6·26	5·2	6·40	4·58	6·41	5·7	6·20	5·24
20 ...	6·27	5·1	6·41	4·58	6·40	5·8	6·18	5·24
21 ...	6·27	5·1	6·41	4·58	6·40	5·8	6·17	5·25
22 ...	6·27	5·1	6·41	4·58	6·39	5·9	6·16	5·26
23 ...	6.29	5·1	6·42	4·58	6·38	5·10	6·15	5·27
24 ...	6·29	5·1	6·42	4·58	6·38	5·10	6·14	5·27
25 ...	6·30	5·0	6·42	4·58	6·37	5·11	6·13	5·27
26 ...	6·30	5·0	6·42	4·58	6·37	5·11	6·13	5·27
27 ...	6·30	5·0	6·42	4·58	6·37	5·11	6·12	5·28
28 ...	6·31	4·59	6·43	4·59	6·36	5·12	6·11	5·30
29 ...	6·31	4·59	6·43	4·59	6·36	5·12	6·10	5·30
30 ...	6·32	4·58	6·43	5·0	6·35	5·13	6·7	5·31
31 ...	6·32	4·58	...	...	6·34	5·14	6·6	5·31

PHASES OF THE MOON.

			H.	M.
4 May	☽	First Quarter	5	26
11 ,,	○	Full Moon	11	18
19 ,,	☾	Last Quarter	1	18
27 ,,	●	New Moon	8	50
1 ,,		Perigee	3	0
2 June	☽	First Quarter	11	24
10 ,,	○	Full Moon	1	8
18 ,,	☾	Last Quarter	4	44
25 ,,	●	New Moon	4	11
2 July	☽	First Quarter	7	2
10 ,,	○	Full Moon	3	43
18 ,,	☾	Last Quarter	5	24
24 ,,	●	New Moon	10	46
31 ,,	☽	First Quarter	5	15
8 Aug.	○	Full Moon	6	54
16 ,,	☾	Last Quarter	3	22
23 ,,	●	New Moon	5	51
30 ,,	☽	First Quarter	6	34

Orchard Notes for August.

By ALBERT H. BENSON.

The planting of deciduous trees should be completed by the end of this month in all parts of the State, but evergreen trees can be transplanted during seasonable moist weather at any time of the year if the operation is carefully carried out. When set out, the young trees must be cut hard back to a height that in no case should exceed 2 feet from the ground, and in warm dry districts half of this height is to be preferred. Cutting back at planting insures a strong and vigorous young growth, whereas by neglecting to cut hard back at planting the future growth, vigour, and symmetry of the tree are greatly impaired if not completely spoilt. The pruning of all deciduous trees must also have been completed; and all citrus fruit trees from which the fruits have or should have been gathered should be gone over carefully, all dead and badly diseased wood should be removed, and any crossing or superfluous branches, or water sprouts, should be cut away. When the trees are badly attacked by scales, this pruning should be severe, in order that the remedies used for dealing with these pests may have a fair chance, as when the top of a citrus tree is allowed to grow like a mat it is impossible to get the spraying material on to the parts where it is most wanted. Spraying should be systematically carried out in every orchard in the State during this and the preceding month, and in the case of fungus diseases on deciduous trees during the following month as well. Spraying is just as essential an operation as the gathering of the fruit; and no fruit-grower who wishes to make fruit-growing a success can afford to neglect it, as it is impossible to breed disease in fruit trees and to grow fruit profitably at one and the same time. A full description of the operation of spraying and of the most approved remedies was published some time ago in pamphlet form by the Department of Agriculture, so that any grower who has not received a copy and who desires to obtain the necessary information may obtain it by writing to the Department. After pruning and spraying, the orchard should be ploughed; so that all weeds and trash can be buried, and also that the land that has been trodden down firm shall be broken up. Use a short American plough that will take a wide furrow and turn it right over. The depth at which to plough will depend on the treatment the orchard has previously received and on the nature of the soil. If the soil is shallow, or if the land has never been worked, then the ploughing must be shallow or the roots will be badly injured; but where there is plenty of soil and a perfect subdrainage, then the ploughing can be from 4 to 6 inches in depth (provided the land has been previously cultivated) without any injury to the trees. In fact, in such soil surface roots are not required, and the trees stand dry weather best when deeply rooted.

Quick-acting artificial manures, such as sulphate of ammonia, sulphate of potash, or superphosphate, can be applied during the month, but care should be taken not to apply too large a quantity at once, as, owing to their extreme solubility, a considerable portion of them is apt to be washed out and lost by heavy rains. In conclusion, one more word about spraying, and that is: Do your utmost to stamp out diseases in new districts as soon as ever they make their appearance. Do not consider any disease too trivial, and that it can be well let alone to a more convenient time, as the more convenient time will not come; but the disease will flourish and spread rapidly, so that what might have been checked, if not eradicated, by half an hour's work will now take the grower all he knows to get the better of it. In spraying, whether for insects or fungi, a knowledge of the pest to be treated, combined with carefulness and promptitude, are the essentials of success.

In notes of this kind it is impossible that they can apply equallv to every part of the State, but they will be found to be about an average. Very early districts will sometimes require the notes of a month later, and very late districts those of a month earlier; but this will right itself when a year's notes have been written.

Farm and Garden Notes for September.

Field.—Spring time has now arrived, and with it there will be the usual trouble with weeds, especially on carelessly cultivated land. Therefore the cultivator, the hoe (horse or hand), must be kept vigorously at work to check the weed pests, and save the growing crops and much future labour. Attend to earthing up any crops which may require it. There may possibly occur drying winds and dry weather ; still good showers may be looked for in October, and much useful work may be done during the present month, which will afford a fair prospect of a return for labour. Sow maize, sorghum, imphee, prairie grass, panicum, tobacco, and pumpkins. Sugar-cane planting should be vigorously carried on. Plant sweet potatoes, yams, earth or pea nuts, arrowroot, turmeric, ginger, and canaigre (bulb yielding a valuable tanning substance). Plant out coffee.

Kitchen Garden.—Now is the time when the kitchen garden will richly repay all the labour bestowed upon it, for it is the month for sowing most kinds of vegetables. If the soil is not naturally rich, make it so by a liberal application of stable manure and compost, dig or plough the ground deeply, and afterwards keep the surface in good tilth about the crops. Water early in the morning or late in the evening, and stir the soil in the latter case early next day to prevent caking. Mulching with straw, or leaves, or litter will be of great benefit as the season gets hotter. It is a good thing to apply a little salt to newly dug beds. It is not exactly known what the action of salt is on the soil, but when it is applied as a top-dressing it tends to check rank growth. A little is excellent for cabbages, but too much renders the soil sterile and causes hardpan to form. French or kidney beans may now be sown in all parts of the State. The Lima bean delights in the hottest weather. Sow the dwarf kinds in drills 3 feet apart and 18 inches between the plants, and the climbing sorts 6 feet each way. Sow cucumbers, melons, marrows, and squashes at once. If they are troubled by the beetle, spray with Paris green or London purple. In the June issue of the *Journal* Mr. S. C. Voller gave an excellent recipe for a spray for vegetables. In cool districts peas and even some beetroot may be sown. Set out egg plants in rows 4 feet apart. Plant out tomatoes 3½ feet each way, and train them to a single stem either on stakes, trellis, or wire netting. Plant out rosellas. Sow mustard and cress, spinach, lettuce, vegetable marrows, custard marrows, parsnips, carrots, eschalots, cabbage, radishes, kohl rabi, &c. These will all prove satisfactory, provided the ground is well worked, kept clean, and that water, manure, and, where required, shade are provided.

Flower Garden.—Continue to plant bulbs as directed last month. Protect the plants as much as possible from cold westerly winds, which may still occur, notwithstanding the increasing temperature. Keep a good lookout for slugs. Plant out chrysanthemums, palms, and all kinds of tropical and semi-tropical plants. If hot weather should ensue after planting, water and shade must be given. Sow dianthus, snapdragon, coleus. Roses will now be in full blown. Keep them free from aphis, and cut off all spent blooms. This latter work should be done in the case of all flowers. If you wish to save seeds, do not wait for the very last bloom, but allow some of the very best to go to seed. If you have any toads in the garden or bush-house, be careful not to destroy them, but encourage them to take up their abode there. They are perfectly harmless in spite of their ugliness, and they destroy an astonishing number of insects injurious to plants. Fill up all vacancies with herbaceous plants. Sow zinnia, galliardia, amaranthus, cockscomb, balsam, sunflower, marigold, cosmos, summer chrysanthemum, coreopsis, portulacea, mesembryanthum, calendula, &c.

Plate VIII.

DISTRICT EXHIBITS, BOWEN PARK, 1903.

Agriculture.

THE DISTRICT EXHIBITS AT THE EXHIBITION AT BOWEN PARK.

Every Queenslander must feel that the presence of our neighbours of the north coast country of New South Wales, together with those of the Hawkesbury and Wagga, has forged another link in the chain which binds the Northern portion of New South Wales to Southern Queensland. From an agricultural point of view, the interests of these portions of the two States are almost identical. This position was demonstrated by a visit to the Courts of the Clarence River, of Glen Innes, and of the Hawkesbury Districts of New South Wales, and by a comparison between the exhibits of those districts with those of Moreton and of the Darling Downs as exemplified by the similarity between the products of each State. For instance, we note in the exhibit of

THE CLARENCE RIVER DISTRICT

cereals of all kinds, potatoes, millets, root crops, sugar-cane, maize, ensilage, enormous pumpkins, hay in diminutive bales, butter, cheese, bacon and hams, preserved fruits, yams, hides and skins, coffee in all its stages, exquisite pickles and jams, timbers, needlework, and school exhibits, and, what is not shown in any other district, saffron; also cowpeas of various kinds, cotton and silk cocoons.

Now when we enter the court of

GLEN INNES

we find the products of that fertile district, all of which have been collected within a radius of ten miles of the town, to be much similar to those of the Clarence. There are set out, in tasteful array, hay bales, skins of marsupials and of Angoras, ensilage, millets, maize, tobacco, seeds of all kinds of cereals and legumes, fine vegetables, fruits such as apples and pears, wool, wines, pasteurised butter and cream, preserved fruits, jams, pickles, cakes, lollies, hares and roosters, chestnuts, walnuts, Barcelona nuts, and some beautiful branches of real English holly laden with red berri s. Here also are to be seen many specimens of precious stones, gold and other metals. Amongst other metals are some fine exhibits of molybdenite, the largest crystal in the world. The potato planter, which we illustrated in the *Journal*, Vol. XI., page 96, is also shown in the Glen Innes Court. This planter was introduced to the district by Mr. Richard Alcock, and is much used by growers of potatoes, obviating as it does the stooping to place the sets in the furrow. The simple implement consists of three pipes of galvanised iron set at angles, which allows of the seed being dropped at equal distances. The planter carries it in his left hand, sets it in the furrow, and with his right hand drops a set into each pipe. He then makes a step forward, lifts the light machine a foot beyond the last dropped set, and repeats the process. One man can plant 4 acres a day by means of this cheap and simple contrivance. Another instrument in this Court is a combined potato hiller and digger, made by Mr. J. Scully, of Glen Innes. Some beautiful hand-carved timbers are shown here, the handiwork of Mr. J. Anschau.

THE MORETON DISTRICT EXHIBIT.

The old prestige of the Moreton men has lost nothing at the Exhibition of 1903. Much depends in the getting up of a district exhibit in the manner in which it is displayed; and in this art those entrusted with the Log n, Albert, Pimpama, Blackall Range, &c., exhibits have shown themselves to be past-masters. The Moreton Court is one which shows to the fullest advantage the adaptability of the climate and soil of hill, valley, and plain for the most varied productions, for which this large district is famous.

The show of sugar-cane cannot be surpassed by the irrigated cane of the North. No one looking at the unique display of exhibits, agricultural and horticultural, and of manufactured articles of numerous kinds would be inclined to believe that not twelve months ago the whole district included in the Moreton was in the grip of a merciless drought, which left the country a practical desert. It is much in favour of this part of the State that a variety of climates, soils, and industries are included in it. Thus there were fruits from Nudgee and Nundah, from Maroochy and Eumundi; dairy exhibits from Woodford, Samsonvale, and Samford; sugar-cane and coffee from the Blackall Range, as well as magnificent oranges and strawberries, hams, bacon, butter, cheese, &c., from the various factories which are established in the Moreton area; citrus fruits, potatoes, and wonderful vegetables—all grown within a few hours' journey of the metropolis. The strawberries and citrus fruits shown by Mr. W. H. Harvey, of Montville, Blackall Range, were simply marvellous, particularly a variety of strawberry called the "Annetta," which we have never seen equalled for size, colouring, and flavour. There were also in this collection nine varieties of oranges, including most perfect Beauty of Glen Retreat, Washington Navel, and Emperor Mandarin oranges. Pages could be written descriptive of the district exhibits, but, as our space is limited, we must refer our readers to the excellent reports in the metropolitan journals.

MACKAY.

It is natural that Mackay should be well to the front with sugar-cane and its products, of which there was a great variety nicely got up and elegantly displayed. A unique item was a well-preserved alligator, showing half its scaly body from under the bushes, which invited visitors to "Come in out of the wet." Fruit, in the shape of pineapples, cocoanuts, oranges, bananas, tamarinds, &c., was well displayed, and of fine quality. An interesting exhibit here was a growing vanilla plant and some ripe pods of vanilla ready for market. Some white bamboo sugar-cane showed about 12 feet of crushing cane. Amongst the manufactured articles were—glucose, wines, jams, preserved fruits, pickles, sea salt, sisal hemp, brooms, cassava; and also were to be seen dried fish, cotton, peanuts, and a fine exhibit of minerals. Coffee in all its stages was also to the fore. Taking the exhibit as a whole, it did infinite credit to Mackay, and the mode of displaying showed that our Northern friends run the Southerns very close in that art so very essential at an exhibition. Mention should be made of a very well constructed model of Sir Thomas Lipton's Shamrock III., and of a paddle steamer perfect in all its details.

THE LOGAN EXHIBIT.

The Logan district, although not so extensive as the Moreton, made a very fine display of its varied products. The samples of sugar-cane were very fine, although grown without irrigation. Some Daniel Dupont nine months old, grown by Mr. G. Meiers, showed quite 9 feet of cane, fit for the mill. Arrowroot and cornflour, for which the Pimpama district is famous, and a trophy of preserved fruit attracted much attention. There were fine exhibits of hay, millets, vegetables, fruits, and manufactured articles, besides timbers of various kinds valuable for the trade. One exhibit was very interesting—a model steam engine and boiler working a circular saw, made by Mr. B. S. Dennis, of Slack's Creek. Messrs. Baynes Bros. had a very fine trophy in this section of tinned meats.

THE NEW SOUTH WALES DRIED FRUITS

from Hawkesbury College and the Bathurst and Wagga Experiment Farms were most exquisitely got up. They consisted of dried and crystallised apricots, plums, prunes, raisins, figs, walnuts, and many others, prepared and displayed in a most tempting manner, and showing to what perfection this industry has been brought in the sister State. Now that a considerable quantity of fruit is grown on the State Farms in Queensland, it will probably not be long before a fruit-drying plant will be at work at either the Hermitage or Westbrook.

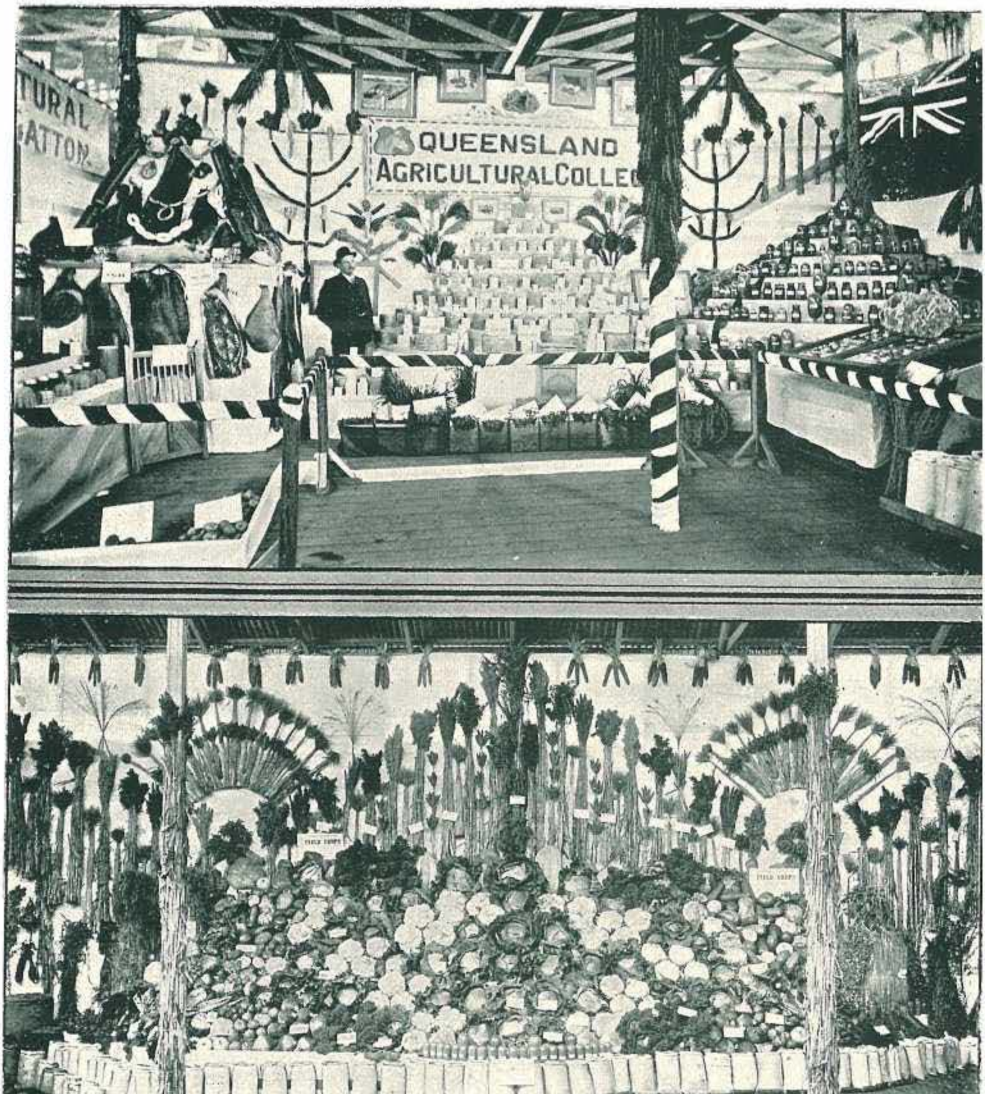
Plate IX.

DISTRICT EXHIBITS, BOWEN PARK, 1903.

Plate X.

New South Wales Exhibits, Bowen Park, 1903.

Plate XI.



EXHIBITS OF THE QUEENSLAND AGRICULTURAL COLLEGE, HERMITAGE AND WESTBROOK STATE FARMS, BOWEN PARK, 1903.

THE AWARDS.

The judges had a hard task before them to award the prizes for the District exhibits, yet they succeeded in satisfying even the losers. The prize-money amounted to £300, to be divided according to the number of points gained by the exhibits. The result was as follows:—

——	Moreton.	Glen Innes.	Clarence.	Logan.	Mackay.
Dairy produce—maximum 10	7	6	5	7	3
Foods (fresh and preserved)—maximum 10	10	3	5	10	2
Fruits, vegetables, and roots—maximum 10	8	6	6	8	5
Grains—maximum 10	3	10	8	5	4
Manufactures and trades—maximum 10...	6	6½	6	6¼	6½
Mineral and building materials—maximum 5	3	5	3	2	2
Tropical products—maximum 10	4	...	6	4	9
Wine (and other drinks)—maximum 5 ...	5	3	3	2	3½
Tobacco (raw and manufactured)—maximum 5	...	1	1	...	2
Hay, chaff, grasses—maximum 10 ...	5	9	7	4	1
Wool—maximum 5	2	5	1	1	...
School exhibits—maximum 5	4	3½	3½	2	4
Effective arrangement—maximum 5 ...	4	2	2	3	1
TOTAL	61	60	56½	54¼	43

The judges in the districts' collections of exhibits were Messrs. J. Stodart, R. W. Thurlow, C. Taylor, P. McLean, A. Midson, A. H. Benson.

Mr. F. W. Peek very efficiently performed the office of steward for the district exhibits.

QUEENSLAND AGRICULTURAL COLLEGE.

This institution is, as usual, well represented at the Exhibition; and the excellence of the various exhibits, their general get up, and the artistic manner in which they are displayed are evidence of the painstaking care bestowed upon the students, who are directly responsible for their production. The entire collection may be said to be the result of their work, under the instruction and supervision of the Principal, Mr. John Mahon, and his coadjutors. The arrangement of the Court is highly creditable to all concerned. Here one naturally looks for the products of the dairy, and the anticipation is fully realised. The College is famous for its excellent breeds of dairy cows, and for its butter, cream, and cheese of various kinds, such as Cheddar, Stilton, Gorgonzola, potted cheese, and the very mild cheese so much in favour in Brisbane and elsewhere. Not only, however, are these delicacies the chief of the products of the College farm, but the large numbers of varieties of field, orchard, and market garden produce are most conspicuous, and give evidence of the richness of the soil and the care bestowed upon its cultivation. There are more than a dozen different kinds of sorghums and millets, grasses native and exotic, chief among which is the celebrated *Paspalum dilatatum.* Many of these, besides lucerne and oats, were made up into compact neat bales, which were formed into a trophy. These bales were a good object lesson which, will, doubtless, be noted by future exhibitors in these sections. As for the vegetables, they were nearly all of most extraordinary size; cabbages, cauliflowers, mangel wurzels, and swedes were such as it would be impossible to beat unless by such monsters as were shown by the State farms and some of the district exhibitors. We lately saw a field of very fine broom millet on the College farm. This has since been harvested, and the raw fibre was shown together with some brooms made by the students of the College. There was also a plough and cultivator made by them, which reflects much credit on the instructors and on the aptitude of the students.

The College is famous for its breeds of pigs, and some very fine hams and bacon made at the institution were shown. The fine arts, if we may call preserves by that name, are not neglected; and some very excellent preserves were shown, made by Mrs. Mahon.

THE DAIRY CATTLE.

The College scored heavily in the prize list for dairy cattle, some of which are here illustrated. In the Ayrshire class, the Ayrshire cow, Laverock, a Gordon, from Louisa 2nd—Glen Elgin, took the champion prize.

In Jerseys, for groups, bull and two of his progeny, the College came first with Chieftain VIII. For bulls over three years, Chieftain was awarded a second prize. The prize list is as follows:—

Ayrshires.—Ayrshire heifer, Loss, 2nd; heifer, no name, 1st in group; no name, 3rd; Lavina, 2nd and 3rd in group; Laverock, 1st also 1st in group and champion cow; Annie Laurie, 3rd; Blink, 3rd; Ayrshire bull, Scotch Jock, 3rd; same bull and two of progeny, 2nd; Ayrshire bull, Patsy, 2nd and 3rd; dairy Shorthorn, Topsy, 1st; dairy Shorthorn, Cherry, 2nd.

Jerseys.—Chief, 2nd; Chieftain VIII., family group, 1st, and for bull, over three years, 2nd; Jersey Belle and two daughters, with Bliss, took four prizes; and Careless, in the group with Chief and Chieftain VIII, came 1st.

ANGORA GOATS.

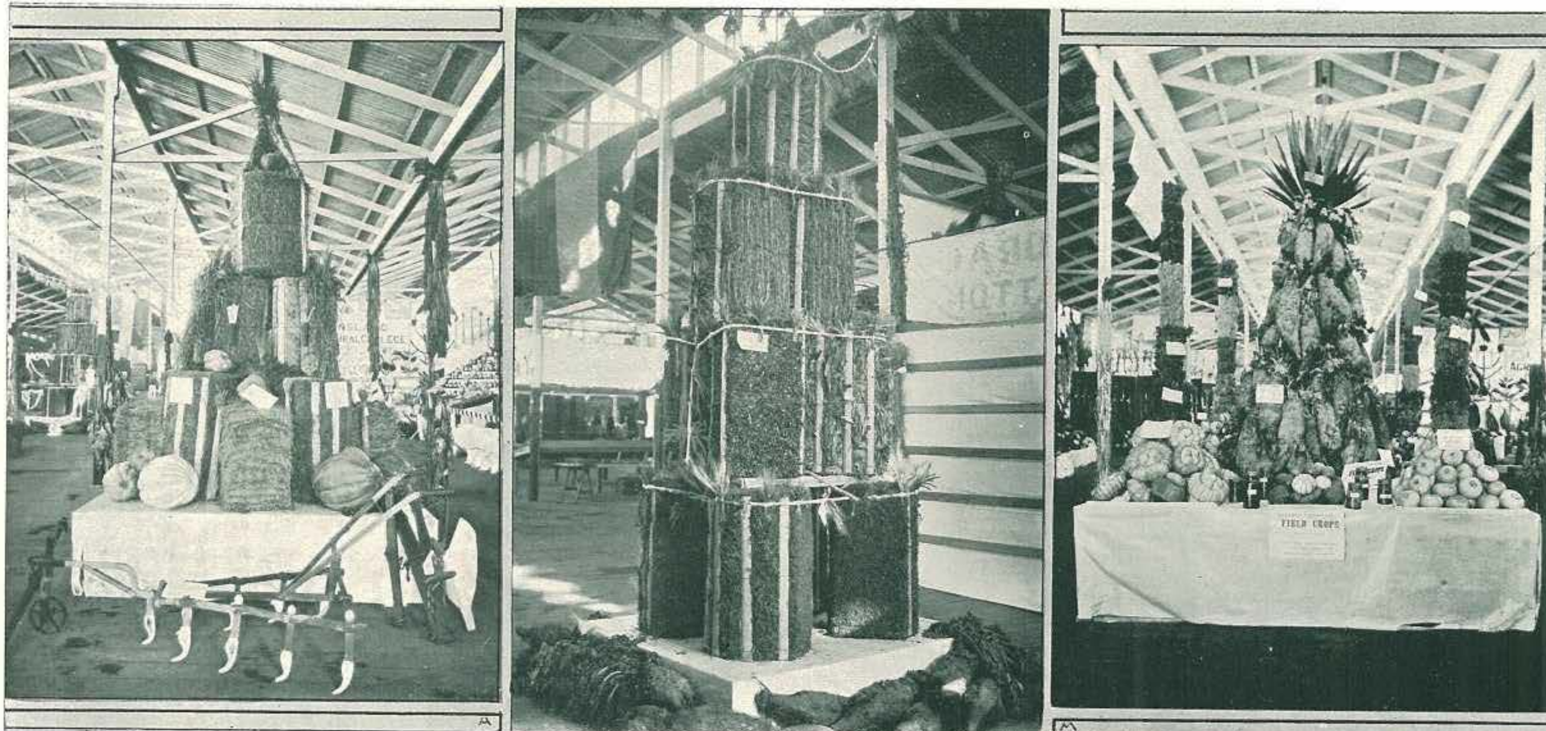
There were, for the first time in the history of the National Association, some exhibits of Angora goats. These valuable animals are gradually coming to the front in Queensland, and inquiry is constantly being made as to their value, habits, and to the value and marketing of mohair.

A first and a special prize for two does were awarded to Mr. J. C. Brünnich, of the Agricultural Department. Messrs. Kerr and Cooling took a first and second for doe and progeny and for a family group, and also second prize for a doe. A first and special prize were given for a buck and doe to Mr. J. H. Lemon; whilst Messrs. A. T. Blaxland and Sons' buck, valued at £25, was awarded a highly commended, having arrived too late for judging. We would point out to exhibitors of Angoras that washing and combing them for exhibition should not be resorted to. The one destroys the gloss of the hair, and the other its natural waviness. This was clearly demonstrated in the case of at least one animal at the show.

SEED WHEATS IMPORTED FROM SOUTH AUSTRALIA.

With the exception of White Tuscan and Allora Spring, which may now be called a universal wheat, all the wheats imported by the Department of Agriculture for distribution amongst the farmers are of South Australian origin. The varieties obtained in that State by Messrs. McLean and Lamb were:—Marshall's No. 3, Allora Spring, Gluyas Smart's, Smart's Early, Dart's Imperial, Newman's, Early Para, Bluey, Petatz', Surprise, Budd's Early, White Tuscan, Warwick, Leatherhead, Carmichael, Australian Wonder, Hamblyn's Prolific, Silver King, Marshall's No. 1, Fill Bag, Baroota Wonder, Steinweidel. From accounts received from the wheat-growing districts, all the varieties sown have germinated, and are growing even too luxuriantly. The constant rains of July and August caused much of it to lodge, and many farmers turned in sheep to the paddocks to eat it down. What is now wanted is a spell of fine weather for a month or so; then, should rust not make its appearance, there should be a record crop all over the country.

Plate XII.



TROPHIES IN THE QUEENSLAND AGRICULTURAL COLLEGE, HERMITAGE, AND WESTBROOK COURTS, BOWEN PARK, 1903.

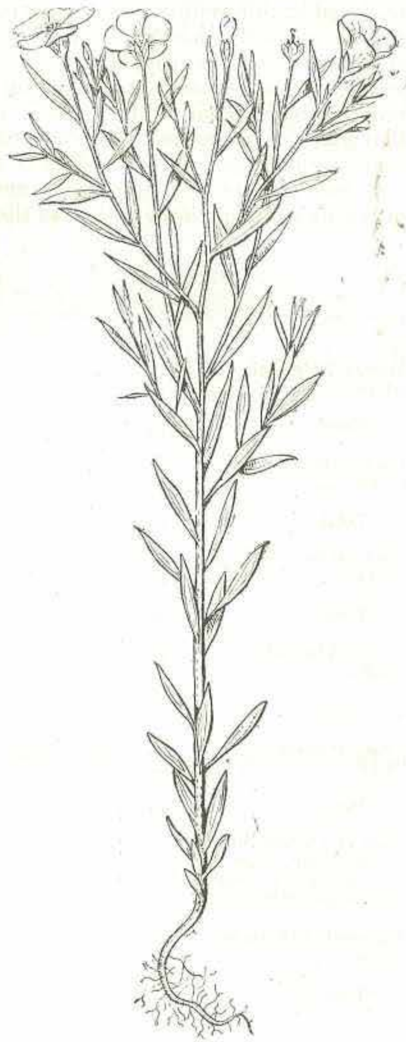
FLAX.

The following notes on flax culture are taken from Bulletin No. 6 of the Department of Agriculture, Regina, North-West Territories, Canada. From them the Queensland farmer may rightly infer that flax would be for him a very paying initial crop on first breaking up his land prior to preparing it for wheat:—

The cultivation of flax for fibre is very ancient, as evidenced by the fact that Egyptian mummies were wrapped in linen. The great botanist, Linnæus, gave the plant the name of *Linum usitatissimum*. From the word *Linum* are derived our words linen, linseed, lint, &c. The specific name *usitatissimum*, which means "most useful," was most appropriately given.

Flax is an annual plant growing from $1\frac{1}{2}$ feet to 2 feet high, occasionally reaching a height of 3 feet. When sown thick for producing fibre the stalk is straight and tall without branches, but when sown for seed purposes it branches considerably. Its flower is of a purplish blue colour, and the characteristic flat brown seeds are produced in seed pods, or "bolls," having ten divisions or cells with a single seed in each. The seeds have a polished surface and a mucilaginous coating which readily dissolves in hot water, and from which is made what is called "flaxseed tea." The seed contains about 15 per cent. of mucilage, and yields from 22 to 27 per cent. of oil, known to commerce as linseed oil. The oil is extracted by grinding the seed, heating it by steam, and then, while hot, subjecting it to hydraulic pressure, when the oil freely runs out. The cake left after the oil is extracted is the well-known "oil cake," so much used for feeding stock.

The fibre is the most valuable part of the flax plant, but so far it has not been taken into account in the west. It is hoped, however, that at no distant date an improved method of extracting the fibre will be devised that will at least permit of the manufacture of binder twine from the flax straw that is now wasted.



IDEAL FLAX PLANT GROWN FOR FIBRE.

IS FLAX HARD ON THE LAND?

The popular idea is that flax is a hard crop on the land, and therefore that it exhausts the fertility of the soil. A study of the root growth of the plant will throw some light on this question. Wheat, oats, or any of the grasses develop a mass of fine fibrous roots near the surface of the ground, and these all act as feeders of the plant. The flax plant, on the contrary, sends down to the subsoil a single long tap root, with very few fibres on it, and, instead of stooling out as do our grains and grasses, it sends up one straight stem which branches out only when it has attained a considerable height. It is thus apparent that, for a flax plant to do well, it must have a large amount of prepared plant food at hand to supply its limited root development. This is also borne out by the fact that the crop only takes from 70 to 100 days from seeding to mature, the average being about 90 days.

In regard to the draft on the fertilityof the soil the following is taken from a United States bulletin :—"The Minnesota station has recently made some investigations which throw considerable light on this point. Flax plants were analysed at different stages of growth, and studies were also made of different soils in which flax had been grown with varying degrees of success. From the analyses of the flax crop, as well as other crops ordinarily grown in the same region, the accompanying table, showing the approximate amounts of plant food removed by average yields of these crops, has been prepared. This table shows that many of the crops ordinarily grown remove more plant food from the soil than the average flax crop. This is strikingly true in the case of corn. The oat crop removes about the same amount of nitrogen and phosphoric acid, but nearly as much again of potash as the flax crop.

Crops.	Weight per Acre.	Nitrogen.	Phosphoric Acid.	Potash.	Lime.
	Lb.	Lb.	Lb.	Lb.	Lb.
Wheat, 20 bushels	1,200	25	12·5	7	1
Straw	2,000	10	7·5	28	7
Total	...	35	20	35	8
Barley, 40 bushels	1,920	28	15	8	1
Straw	3,000	12	5	30	8
Total	...	40	20	38	9
Oats, 50 bushels	1,600	35	12	10	1·5
Straw	3,000	15	6	35	9·5
Total	...	50	18	45	11
Corn, 65 bushels	2,200	40	18	15	1
Stalks	3,000	35	2	45	11
Total	...	75	20	60	12
Peas, 30 bushels	1,800	...	18	22	4
Straw	3,500	...	7	38	71
Total	...	...	25	60	75
Mangel-wurzels, 10 tons	20,000	75	35	150	30
Meadow hay, 1 ton	2,000	30	20	45	12
Red clover hay, 2 tons	4,000	...	28	66	75
Potatoes, 150 bushels	9,000	40	20	75	25
Flaxseed, 15 bushels...	900	39	15	8	3
Straw	1,800	15	3	19	13
Total	...	54	18	27	16

"The table shows further that the heaviest draft in flax culture is made upon the nitrogen of the soil, and this fact, taken in connection with the further fact that nitrogen is more abundant in virgin soils than in those that have been cultivated, explains the greater success of flax culture on new land."

THE SOIL.

Experience has shown that any soil capable of producing a good crop of grain is equally suitable for flax. A warm, dry situation is most favourable, whatever the nature of the soil.

In America flax has been largely grown upon new land, and on the prairies it has been looked upon as peculiarly suitable for new breaking. In the new soil it finds an abundance of nitrogen from the decayed vegetable matter, and other plant food, readily available. It has, however, proved a short-lived crop, giving a few good yields, but soon gradually failing. This is so characteristically true that it has come to be looked upon as a new land crop. It is a poor weed fighter, and on new breaking it thus has a good chance to do its best. The general experience is that flax does better on new breaking than any other crop, and that, when well put in, a return of from 10 to 20 bushels per acre may be expected.

Preparing the Land.

There are several ways of preparing the prairie sod for a flax crop. A number of successful growers break about 2 inches deep, then cut the sod fine with a disc harrow and sow, rolling immediately after, so as to leave the ground smooth for harvesting, as the small pieces of sod catching on the guards of the binder cause endless trouble. The objection to this plan is that much of the sod is not rolled. A larger percentage of growers prefer to break 3 to 4 inches deep, but their subsequent treatment differs. The method followed by some growers is to roll immediately after ploughing, then sow with a sharp shoe drill. Successful crops have been raised by this simple treatment. Flax, however, is a crop that likes a well prepared seed bed, and experience shows that extra cultivation will, as a rule, give better returns. Instead of using the roller after ploughing, use the disc harrow, setting it to cut a little earth, but not enough to tear up the sod. Follow with a short toothed harrow; then sow with a shoe or disc drill, and then this leaves the land smooth for the binder.

The use of the roller is essential in attaining the best results. Where the furrow slice is allowed to lie loosely, the moisture coming from below evaporates and the land dries out; if, however, some cultivation is done and fine soil is worked into the spaces at the sides of the furrow slice, and all pressed down firmly with a roller, the moisture cannot escape unless through the sod. The fine earth acts as a mulch holding the moisture, thus presenting the best condition for rotting the sod. Many new settlers do not possess a roller; then what is called a "planker" or "float" can be made. Take two 12 feet planks 10 or 12 inches wide, lap one 4 or 5 inches over the other and spike them together; attach irons near the ends to draw by. Some strengthen the planks with irons at the ends, so that it will be strong enough for any kind of ground, and to carry a stone or two to make it do more effective work. It is a good plan to cut the planks through the centre and put in two strong hinges, as better work can then be done over uneven ground. If a "planker" cannot be made, a stick of timber drawn sideways over the ground does very good work. But planker or log should not be used after the seed is sown, as there would be a probability of uncovering the seed after this were done.

When treated in this way the sod will rot well, furnish food for the growing flax crop, and not be in the way of a crop the following spring. It is generally found that a crop of oats does best on flax stubble, though many sow wheat. and some American farmers follow with another crop of flax. The land should then be summer fallowed.

Sowing the Seed.

Selection of Seed.—Flax is notorious for the number of weed seeds it has introduced into clean soil. It is, therefore, very important that the greatest care be exercised in the selection of seed. The flax grains are so small and slippery that it is difficult to detect the presence of small weed seeds at a casual glance. The best plan for examining flax closely is to spread a handful out in a thin layer on a sheet of white paper. Plump, well-developed flax seed of good colour is always better than that which is scaly, thin, or bleached. Get it from a thrifty, healthy field, if possible, and even then it is a good plan to run it through a fanning mill, and save the largest and heaviest two-thirds for seed. It is also important to secure seed from a field that has given a heavy yield, as it appears that there are several varieties in general use, some of them giving only a moderate yield, while others are much heavier.

The Time to Sow.—Last year many farmers thought they could sow flax with safety until the 1st of July, but while a few fields escaped the early frosts most of them sown after the 10th of June were frozen. That which missed the early frost was well put in. Experience goes to show that the best time to sow is from the 15th of May to the 10th of June (March to September in Queensland). The most favourable time in this period is the last week of May. On an average flax takes ninety days to ripen; this means that a crop sown the 10th of June will not be ready to cut before the 10th of September, which brings it close enough to the danger of early frost. The new settler can keep breaking and preparing land up to the 15th or 20th of May, when, if the conditions are suitable, seeding may begin. When all the land broken is seeded, breaking may continue again, but seeding should keep pace with the breaking until such time as it is not wise to seed any more. Some successful growers lay great stress on having the seed sown as quickly as possible after the land is broken, so as to secure the benefit of the moisture in the newly-turned soil for a quick germination. It is important that the early breaking be worked down as soon as possible after ploughing, so that it will not dry out.

How much to Sow.—The usual amount is from two to three pecks (28 to 42 lb.) per acre. On new breaking some sow as much as a bushel per acre. When sown late, say as late as the 10th of June, many sow a bushel per acre, the idea being that the plants do not branch so much, and that ripening is therefore hastened.

Depth to Sow.—If there is sufficient moisture present, the shallower the flax is put in the better. Half an inch will do in that case, but the safest way is to sow it from 1 to 2 inches deep. It should not be sown deeper than 3 inches, as it is a small seed and might not then germinate. A few farmers sow broadcast, and harrow it in, but the drill is quite generally used.

HARVESTING.

When grown for seed only, flax is harvested with the self-binder. Some tie it in sheaves, as other grain, but the threshers do not like it in this shape, as it is liable to mat, and does not thresh nicely. The packers of the binder also tend to thresh it. Some remove the sheaf trip, and let the flax run down on to the sheaf carrier. When a bundle about twice the size of a sheaf of grain has gathered, it is dumped in rows. Others take off the binder attachment altogether, thus reducing the weight of their machine, and fit on an apron of light boards to carry the flax from the elevators to the sheaf carrier. If the sheaf carrier allows the flax to fall through, put on a cover of canvas or lumber. Some American manufacturers supply a "flax attachment" for their binders.

Cutting should begin when the plants are three-quarters to nearly all brown. Perhaps the best guide is the knife. If it "gums" badly, the flax is too green. When the knife runs freely without gumming, the flax is right to cut. If the flax gets too ripe, it will shell badly, and this is sometimes the cause of serious loss. If rain falls on the bundles, they must be turned, and if too big there is danger of them heating and matting, thus spoiling the seed. The less the crop is handled the better. For this reason many like to thresh directly from the field. The flax must be rattling dry. Threshing is not begun in the morning until 9 or 10 o'clock, or until the dew is all gone, and stops at 4 o'clock if the dew is falling. If threshed when damp, the seed will not be all taken out, and the straw will wind on the machinery. If stacked, the crop must be very dry, or there is danger from heating.

POISONOUS PROPERTIES.

It is not generally known, but it is an accepted fact, that animals may be poisoned by feeding on the chaff of flax, or on the straw of weak and debilitated plants.

A FLAX DISEASE.

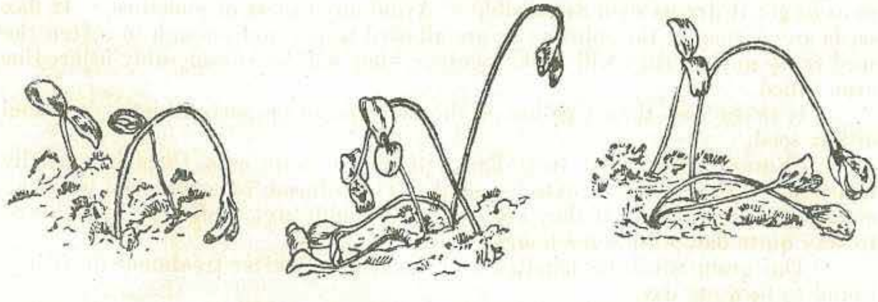
Experience, the world over, has shown that close or continuous cropping with flax has never been successful, no matter what the fertility of the land. A few crops may be taken in succession, but the yield rapidly diminishes, soon the land refuses to grow flax at all, and is then said to be "flax sick." In Europe and the United States it has been found necessary to grow flax in a rotation, separating the crops by from seven to eleven years.

It was first thought to be due to soil depletion—that is, that it was a hard crop on the land, and exhausted the fertility, so that a successful crop could not be raised.

This has been proved not to be true, as "flax sick" soil will grow good crops of other grain. Professor Sheppard, of the North Dakota Experimental Station, says on this point:—"Wheat following a crop of flax, as an average of two trials on the same plot, gave 2 bushels 30 lb. (12½ per cent.) heavier yield than the wheat continuously plots. The second crop of wheat after a crop of flax gave as an average of two trials on the same plot 4 bushels 12 lb. (26½ per cent. heavier yield than the wheat continuously plots. Wheat grown on a plot which had produced three consecutive crops of flax, as the only change from wheat, gave 7 bushels 12 lb. (48½ per cent.) heavier yield than the wheat continuously plots. Flax grown continuously for three years gave no indication of any bad results on the crop produced the second and third years."

It was next thought that flax was "unkind" to flax, leaving something in the soil which was detrimental to the health of succeeding flax plants. By allowing from five to seven years to intervene between crops, the remains of the old crop were rotted, and its ill-effects had passed away. The late Dr. Lugger, of the Minnesota Experiment Station, advanced this theory, and thought he had proved that the old flax straw and roots were the cause of the trouble. This theory is now untenable in the light of the work done by Professor H. L. Bolley at the North Dakota Experimental Station.

The history of the work done by the North Dakota Station briefly summarised is as follows:—In 1893 it was decided to sow a small plot with flax seed each year until "something would happen." The yield of flax diminished each year after 1895 until by July, 1900, not a single plant was found alive. Six years' successive cropping with flax brought about this state. Most of the plants succumbed before they reached a height of 3 inches. A study of the plot suggested that the cause of the trouble was due to the work of some fungoid growth. Later the fungus was discovered, and subsequent tests proved that this fungus was the cause of the peculiar wilting of the plants on "flax sick" soil. The term "flax wilt" has been given to this disease on account of the peculiar way the young plants wilt, as though by drought or intense heat.



Flax Wilt.

Mode of Attack.—The spores (or seeds) of this fungus plant may be on the flax seed sown or in the land where it has been found to live upon the humus of the soil. Its filaments ramify through the soil, and if they come in contact with a young plant they penetrate it at any point—through the seed, leaves, stem, or roots—live upon it and soon cause its death. If the disease is sown with seed upon new breaking, only a few plants will be attacked the first year, and at fallowing time the dead plants will be seen. The infected area keeps growing larger, and will usually be found to be more or less circular. The first year these spots may be 3 or 4 feet in diameter, becoming much enlarged if flax is sown the following year. In from three to five years the whole land is infested.

Important to Territorial Farmers.—If only a small amount of the disease is present in the first crop, the spores from the dead plants will be spread through the whole crop at threshing time, and thus contaminate the seed in the same way as the spores of smut on wheat or oats do. This becomes an important question to our farmers, because we have here many thousands of acres of new soil free from this disease. If only a crop is to be taken on new breaking and no more grown, then little attention need be given the matter. But the variety of field crops that can be grown here is not large, and, once the peculiarities of the flax crop are understood, there is no reason why a certain amount of it cannot be grown in conjunction with other crops. It was only a few years ago that Iowa was a banner flax-growing State of the Union; then it was Minnesota, and now it is North Dakota. As about half of her lands are "flax sick," it is only a matter of a few years until Western Canada will be the banner flax-growing district of America. It is important, therefore, that the seed used here should be free from the spores of this "flax-wilt" disease. Much of the seed brought in from south of the boundary is liable to carry infection, because fully 50 per cent. of the soil of North Dakota is now infected. Therefore, farmers should be on their guard, and especially so if the disease spots 3 or 4 feet in diameter have been noticed in last year's crop.

HOW TO TREAT FLAX SEED.

Experiment has shown that the spores of "flax wilt" can be destroyed in exactly the same way as those of smut on wheat or oats—by the use of formaldehyde or formalin. The following is the method of treatment advised by Professor H. L. Bolley as given in Bulletin No. 50 of the North Dakota Experimental Station at Fargo:—

"Use formaldehyde at the rate of 1 lb. of the standard strength to 40 or 45 gallons of water (the same strength used for wheat and oats), spread the seed upon a tight floor or upon a canvas, and sprinkle or spray on a small amount of the liquid (a fine spray is best). Shovel, hoe, or rake the grain rapidly. Repeat this spraying, shovelling, hoeing, or raking until the surfaces of all the seeds are just evenly moist, not wet enough to mat or gum, but evenly damp. (This can be done without matting if the grain is well hoed or shovelled over while the solution is slowly and evenly sprayed upon it.) When the seeds are just evenly moist, cease applying the solution, but continue to shovel the grain over so as to get it dry as soon as possible. Avoid any excess of moisture. If flax seeds are dipped in the solution or are allowed to get wet enough to soften the seed coats so that they will stick together, they will be considerably injured or even killed.

"It takes less than ½ gallon of the solution to properly moisten 1 bushel of flax seed.

"Caution: One must treat flax with much more care than that usually taken in treating wheat or oats for smut. The solution recommended is strong enough to kill all seeds, if they are made thoroughly wet, or if they are allowed to stay quite damp for some hours.

"The grain must be handled over immediately after treatment until it is found to be quite dry.

"NOTE: The seed should be thoroughly cleaned by running through a fanning mill before it is treated, because the solution is not strong enough to kill the disease (fungus), which is inside bits of straw and chaff."

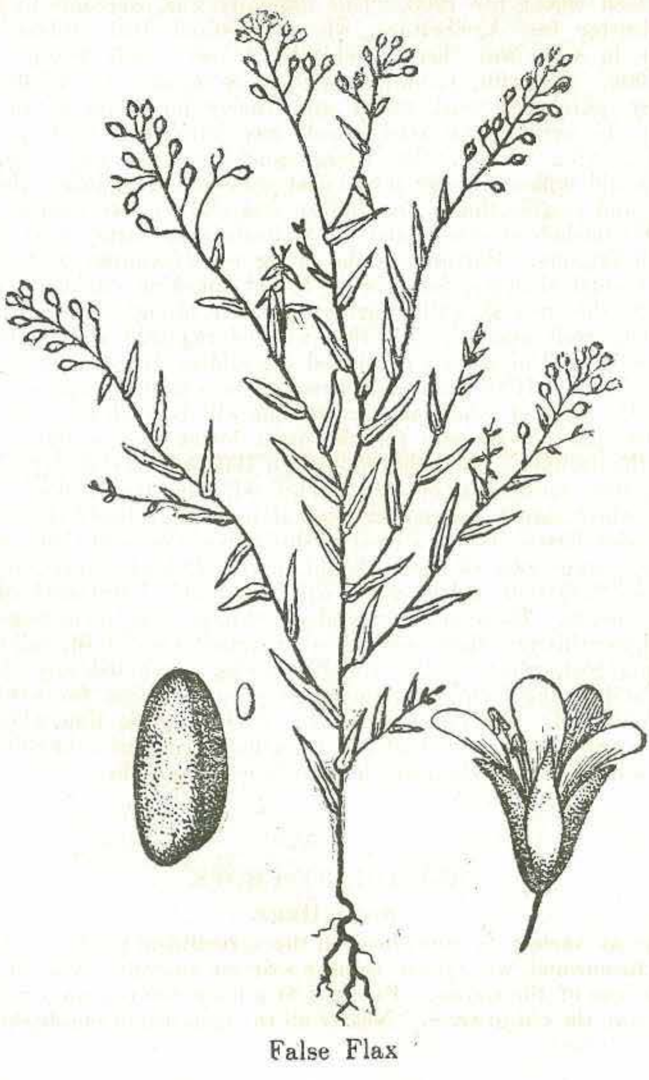
Complaint was made last year that this treatment killed the seed, hence great caution is needed not to let the seed become too wet. If more moisture is applied than needed, throw in more dry seeds at once and stir it over rapidly. It would not be well for anyone to treat all his seed this year. Try a sufficient amount to sow an area from which to save seed for next year.

"Forewarned is forearmed." If farmers understand the characteristics of the flax plant, the true reason for "flax sick" soil, and take due care to prevent "flax wilt" getting a footing in their soil, there is no reason why flax should not continue to be successfully grown for many years. It is not, however, probable that farmers in these Territories will find any great advantage in growing flax on land fit for wheat, and it is very uncertain whether, at the end of three years, the man who breaks his land and later backsets and discs it for a wheat crop the following season will not be as far ahead at the end of three years as the one who sows flax on his breaking.

WEEDS.

For the newcomer it may be, as stated before, an advantage to realise something from his first season's work, but the chances are greatly in favour of many of the noxious weeds being introduced into his fields with flax seed. If seed has been carefully selected and cleaned, it will be possible for a man to go through his growing crop and pull such weeds as may then be seen. A little attention of this kind will save a great deal of future trouble. Of the weeds found in flax fields probably the most common are false flax and wild mustard.

False Flax.—This is a member of the mustard family bearing pale yellow flowers which produce pear or balloon shaped pods containing numerous yellow seeds.



False Flax

PROBABLE WHEAT YIELD.

It is too soon as yet to forecast with any degree of accuracy the wheat harvest of 1903-4; in the absence of any reliable figures as to the area of land placed under wheat and barley this season, we can only arrive approximately at the probable results. It is generally stated that the breadth sown this year is more than double that of 1901, including what is sown for hay and green fodder. The harvest for that year reached 1,692,222 bushels from 87,232 acres, giving an average return of 19·40 bushels per acre, which was the highest yield for the past eleven years, with the exception of the year 1894, when the crop averaged 19·48 bushels per acre, with a grand total yield of 545,185 bushels from 27,991 acres. Last year 1,880 acres were under wheat for grain, 867 for hay, and 607 for green fodder; but owing to the severity of the drought there was practically no crop, the total harvest only reaching 6,165 bushels of grain and 1,049 tons of hay. To show how such a deficit affects this State, we will take our population at 450,000, and, reckoning 8 bushels as the consumption of each individual per annum, our needs come to 3,600,000 bushels in round numbers. Hence it became necessary to import largely from Argentina and other wheat-growing countries for milling alone, and there still remained the difficulty of obtaining seed wheat for 1903. This difficulty was overcome by the action of the Minister for Agriculture, who recognised that unless assistance were given in some way, there would be a very small breadth of wheat sown in 1903. Accordingly, two gentlemen were sent to South Australia, where they purchased seed wheat and barley on behalf of the Government. On its arrival, the seed wheat was purchased by farmers in all the wheat-growing centres, the Department charging only so much per bushel as would suffice to cover actual cost price in Adelaide and the expenses of freight and distribution. The barley was sold in like manner, and thus some 60,000 bushels of wheat and 9,000 bushels of barley were distributed amongst the farmers. Fortunately the latter were favoured with magnificent weather. Genial showers, followed by bright sunshine, enabled them to get the seed into the ground, whilst further showers brought it up, and now the crop is fairly well assured. All that will be required will be rain at the flowering period. The wheats purchased are said to be good milling varieties and rust-resistant. If all goes well, there will be a record crop, and it is to be hoped that the price of wheat at harvest time will be such as to go some way towards recouping the farmers for the great losses they sustained in consequence of the drought. The area cropped for 1903 will, as stated, probably total up to more than double that of 1901. This will mean that over 110,000 acres now under wheat may be reaped for grain alone, and probably 10,000 to 12,000 acres are under barley. Given a good season, rain at the right time, and absence of rust, the average yield of wheat should be over 20 bushels per acre, or a total yield of some 2,200,000 bushels, which will come within 1,400,000 bushels of our own requirements. There is reason indeed to hope that the average yield will be much higher this year than ever before in consequence of the soil having had such a long rest, owing to the drought having prevented any crops being harvested, and to the frequent ploughings in preparation for sowing should rain have occurred. The rains have come at the precise time when moisture was needed, and the result is that the wheatfields present a magnificent sight now, and promise a most abundant harvest in a few months.

SUBSIDIARY CROPS.

SISAL HEMP.

So far as variety is concerned in the agricultural products of individual farms in Queensland, we appear to have scarcely emerged from the old "corn and potato" era of the sixties. Farmers, as a body, are too conservative to get quickly out of the old grooves. Nearly all the eggs are in one basket. When the basket is upset, as during the drought, the farmers had nothing to fall back upon. Why should not two or three or more crops be grown other than the main one, be the latter sugar, coffee, wheat, or anything else? If any man had planted 4 or 5 acres of sisal hemp on the worst portion of his land five years ago, he could laughed at the drought, and would have been making good money whilst others were losing. One thousand plants per acre would in four years yield 2,000 lb. of fibre worth £30 a ton in London. Reduce this to £14 a ton after allowing for cultivation, preparation of fibre, packing, freight, discount, commission, &c. Cost of a machine—the Raspador—£30. Such a machine would suffice to clean the product of 50 acres of plants at the rate of 330 lb. of clean fibre per day. The 5 acres would have brought him, at the very least computation, between £50 and £60.

PEANUTS.

The Spanish peanuts will yield 40 bushels of nuts per acre worth 2d. to 3d. per lb., and the vines make excellent hay. One acre of nuts will fatten ten pigs.

In the United States the peanut is one of the staple crops in many States, as will be seen from the following extract from the *Southern Planter*:—The demand for these nuts has been good, prices are better than for some years past, and the stocks held by dealers are, we are told, small. This would indicate a good demand for the next crop, as the consumption is a growing one both for domestic use and for oil and feeding purposes. We are strongly of opinion that, if better methods of preparation of the land and a better system of rotation were followed and more consideration were given to the requirements of the crop in the way of fertilisers, much heavier crops would be grown than the average now raised. The crop is an important one in Eastern Virginia and North Carolina, and the land well suited for its production, but in many sections they have been too long grown on the same land without a rotation of other crops. According to the census reports, the area devoted to growing peanuts in 1899 in Virginia was 116,914 acres, and the product was 3,713,347 bushels, the average yield per acre being 31 bushels. In North Carolina, in the same year, 95,856 acres were devoted to the crop, and the yield was 3,460,439 bushels, the average yield per acre being 36 bushels. These yields are too small to be profitable, and fall far short of what can easily be made; 50 bushels to the acre can readily be made by planting in proper rotation and by fertilising scientifically; 100 bushels per acre have been frequently grown. Too often the practice is to follow peanuts with peanuts year after year, until the land will not produce a crop worth gathering. At best, the only rotation is peanuts followed by corn, and then by peanuts again. This is too short a rotation. A more profitable way would be to grow cowpeas or soy beans, and then follow with peanuts, and after this crop plant sweet potatoes. A dressing of 300 lb. to the acre of acid phosphate should be applied to the cowpea crop, and a mixture of 100 lb. of acid phosphate, 300 lb. of cotton-seed meal, and 65 lb. of muriate of potash, or 30 lb. of kainit to the acre should be applied before planting the peanuts. A dressing of 25 bushels of lime to the acre should be given every three or four years. We are satisfied that, if such a system as we suggest be followed, it will result in a much heavier average yield of nuts, and the fertility of the land will be maintained and enhanced.

COTTON.

Every farmer could plant and look after from 1 to 5 acres of cotton. The light work of picking could easily be done by the boys and girls of the family. To produce 400 lb. clean lint and 600 lb. seed (the produce of 1 acre) costs, say, £4 12s. 2d. This includes every expense, including ginning, bale, freight, marketing, repair of implements, &c. Cotton is worth 6d. per lb., and cotton seed £4 10s. per ton. Thus every acre would produce:—Cotton lint, £10; seed, £1 4s. 1d.; total, £11 4s. 1d. Deducting the cost of production, ginning, and marketing, &c., a net profit remains of £6 11s. 11d., or for 5 acres

£32 19s. 9d. The cost of picking is set down at £2 1s. 8d. per acre. If hired labour be not employed, then £10 8s. 4d would have to be added to the profits. We put the price of cotton at 6d. per lb., but good West Indian cotton brought at auction in April, 1903, 10d. and 11d. per lb. at Liverpool. Dr. Thomatis' letter on the Caravonica cotton, published in this issue, should open farmers' eyes to the value of a cotton crop.

COFFEE.

A few acres could in like manner be devoted to coffee. Each acre of suitable soil in a suitable part of the State will yield up to 10 cwt. of clean coffee. Putting the wholesale market price at the low figure of 50s. per cwt., the gross return per acre is £25, or £125 for 5 acres. Deduct one-half for working expenses, and the result is still in favour of planting a few acres of coffee.

RAMIE.

Ramie (China grass) is a plant resembling the English nettle. It will thrive in any soil but a stiff clay or very wet soil. The stems, as thick as a pencil, will grow to a height of 8 feet, but they should be cut when about 4 feet high. The present price of ramie fibre in London is from £35 to £40 to £56 per ton. The average yield is about 13 tons of stems per acre per annum in each of four cuttings. The stalks are marketable in the shape of ribbons worth from £12 to £15 per ton; 3,000 lb. of ribbons are thus worth from £18 to £22 10s., and the clean fibre would be worth £56 per ton.

CANAIGRE.

Canaigre is a tuber yielding a good tanning material. There is a good market for it in the Southern States. 1,000 lb. of tubers will plant 1 acre. The yield ranges from 12 to 20 tons per acre, and with cultivation a still heavier yield results The tubers shink by drying to two-thirds. The cost of planting, cultivating, irrigating, and harvesting an acre of canaigre is estimated at between £3 and £4, and the returns vary from £30 to £40 per acre, the price for the sliced dried tubers ranging from £7 to £8 per ton. The plant thrives well in Queensland.

CASSAVA.

This plant is easily cultivated, and finds a congenial home in Queensland. There may be no big money in growing cassava, but there is a reasonable good profit to be made of it. A fair crop will average from 6 to 8 tons of tubers per acre. The planting, harvesting, and preparation of tapioca are much the same as in the case of arrowroot. In the last issue of the *Journal* we give an illustration of a cheap grating-mill for cassava roots. Tapioca is worth from £16 to £20 per ton in London. The tubers take no harm if left in the ground for over a year, and thus they may be dug as required.

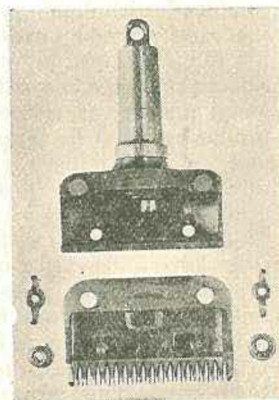
There are several other crops which might be grown subsidiary to the main crops. Such are flax, both for seed (linseed) and fibre; jute for fibre, ginger, &c., &c. On waste portions of the farm wattle-trees might be planted, which in a few years would pay for stripping the bark, and which require no attention during that time in the way of cultivation.

MANURING.

In the days of Queensland's youth, away back in the sixties, at a meeting of the Oxley branch of the old East Moreton Farmers' Association, the subject under discussion was "Manure." Why the subject should have needed discussion at a time when the whole of the land on the river and creek banks from Brisbane to Ipswich consisted of virgin scrub soil of the richest kind, is not quite clear. At all events, the discussion took place, and was carried on with as much eagerness as if every farm were exhausted and no crop could be grown. After about two hours' hard hammering at every conceivable kind of manure and its capabilities, one of the farmers, who had listened to the discussion in silence, got up and said: "You's may talk as yez like about ammoney, and potashes, but gie me a jolly good stinkin' stable dung. When I smells that, I reckon as I don't want none other manure." Now, there is a great deal in this statement so far as farmyard manure is concerned, except that well-rotted stable manure does not emit any very unpleasant smell. Such manure has been used for ages by our forefathers in the old country, who by its help combined with lime, gypsum, marl, &c., raised phenomenal crops on their thousand-year-old farms. It is, however, open to some objection. First, it is not to be obtained in quantities in this land, where the cattle and horses are seldom housed. Secondly, if it were plentiful, it means a great deal of haulage, and a quantity of material is hauled on to the land which is useless for crop-producing; 100 lb. of perfectly prepared—*i.e.*, well preserved under cover—and well rotted usually contains 75 lb. of water, a little more than ½ lb. of nitrogen, about ½ lb. of potash, and less than that amount of phosphoric acid, so that there is but 1½ lb. of these three substances in 25 lb. of dry matter. Thus it will be seen that it is a very bulky manure, and therefore large quantities have to be carted on to the land, and much labour is required to spread it properly. Certainly its bulk is of use to the land, because it opens up stiff soils, and adds humus to light ones, which helps them to absorb and retain moisture and ammonia for the use of the crop. Most farmers in Europe and in the United States, when using stable manure alone, apply from 10 to 20 tons to an acre. This means a great amount of labour and expense. Both these objections are removed by the use of artificial manures, either alone or in conjunction with farmyard manure. The artificial fertilisers enable the farmer to supplement his supplies of dung so easily that it is now thought best to dress the fields frequently instead of heavily at one time. In England potatoes and mangolds are seldom grown without a dressing of dung, usually from 16 to 20 tons to the acre, supplemented with from 2 to 5 cwt. of artificial manures. Experiments have clearly proved that as heavy crops and often heavier ones can usually be grown with half the quantities of dung and artificial manures as with the full dressing of the former alone. All kinds of combination of fertilisers have been tried against each other, and the most successful of all was found to be a mixture of superphosphate, sulphate of ammonia, and sulphate of potash. For a potato crop, then, the following compound fertiliser will give the very best results, of course, where manure has to be applied to ensure a crop:—10 to 12 tons farmyard manure, well rotted; 4 cwt. of superphosphate, 2 cwt. of sulphate of ammonia, and 1½ cwt. of sulphate of potash per acre. If farmyard manure is unobtainable, then add to the artificials —½ cwt. to the potash. Then just before hilling up the potatoes apply 1½ cwt. per acre of nitrate of soda.

SHEEP-SHEARING BY MACHINERY.

Of late years the scarcity of labour has been felt by all classes in the agricultural community. In the olden days the smearers and shearers used to go about the country in gangs, and perform their work at stated times and with almost clockwork regularity. Nowadays, the sheep-shearer, although not quite extinct, is gradually becoming a *rara avis*. To a large extent this is due to the introduction of labour-saving machinery, but probably to a still greater extent to the difficulty of securing labour of any kind on the farm. By shearing sheep with machinery it is calculated that the average fleece will weigh from 10 oz. to 12 oz. more than by hand-shearing, and where a large number of sheep have to be dealt with the employment of machinery is very expeditious, and such a thing as snipping the skin seldom happens. The difficulty for some time was that, for the small flocks of England, makers did not put suitable machines upon the market at sufficiently reasonable prices. This, however, has been overcome, and the number of farms which are now stocked with a hand-shearer must be very large indeed. Messrs. Burgon and Ball, Limited, La Plata Works, Malin Bridge, Sheffield, have designed a machine specially for the English market—



It can be attached to any convenient post in stable, barn, cartshed, or even a tree, and with a youth to turn it the most inexperienced can work it, saving time and worry, and in a short time can become tolerably expert. In the old-fashioned way, of course, shearing was an employment to which a man had to serve a certain time of apprenticeship before he became sufficiently expert. Under the modern system, however, the average labourer can become in a short time wonderfully proficient in the use of this machine. It is necessary, of course, to have a low-priced machine, particularly where the flocks are small. This Messrs. Burgon and Ball have supplied, and another thing in its favour is that it can be converted into a horse-clipper at very small extra expense. Just to indicate the degree of expertness to which champion shearers attain, the following is the result of one week's work with this machine:—

	On Monday	249	sheep were shorn
	„ Tuesday	257	„ „ „
	„ Wednesday	258	„ „ „
	„ Thursday	262	„ „ „
	„ Friday	267	„ „ „
(up to noon)	„ Saturday	144	„ „ „

making for the week a total of 1,437. On the following Monday the same shearer passed 321 nine-month-old lambs through his hands, a feat which indicates the extraordinary degree of efficiency which can be attained by the use of a good labour-saving machine.

In the colonies machine sheep-shearers have long been in use.

CORN STOVER IN THE SILO.

A considerable quantity of maize ensilage is made in this State from green maize when the grains of the cob are in the dough stage. We have not yet heard of any farmer harvesting his grain and then ensiling the dry stover, although some corn stover ensilage was shown at the late Exhibition at Bowen Park, in the exhibit of the Westbrook and Hermitage State Farms. Farmers here do not seem to care about making experiments, whilst the American farmers are constantly trying something new. Professor Shelton, first principal of the Queensland Agricultural College, has forwarded to a friend an American paper—the *Weekly Post of New York*—which contains, amongst many useful articles, two which should be of special interest to Queensland farmers. One deals with the subject of Corn Stover in the Silo, the other with Curing Oat Smut. In connection with the first, a farmer writes as follows to a contemporary New York journal:—

It has been a custom for the past twelve years on this farm to grow corn for ensilage. I have never been convinced that we were receiving the full benefit of the grain in the ensilage, and, moreover, it always required a large additional expense of cotton-seed meal, gluten, and bran to balance the ration, which offset much of the credit given to the silo.

In 1902 the old custom was followed—that is, drilling in the seed three times as thick as for a grain crop. Six acres was drilled in this way for ensilage —3 acres of Pride of the North, and 3 of the Soo. The season, as is well known, was extremely wet, but with care the corn grew well, and by September stood 14 feet high, with a large showing of ears. Seeding so much corn in the fodder, I determined that it should not go into the silo; but it was too expensive to pick it off, so the corn was allowed to mature, then cut and shocked in the usual way (could not get a corn-harvester man to go in to it).

The last of October the Pride of the North was husked and shredded, and a ½-inch stream of water was blown into the silo with the fodder, thus giving it a good wetting. The Soo corn fodder was put in in the same way a month later, and my corn pile tallied over 1,200 bushels. I was naturally much concerned about my ensilage, and was very much pleased to find, on opening it to feed, that it was far sweeter than any "green" ensilage I had had. The cattle were equally pleased, and thoroughly enjoyed it. Then, with a full corn crib, I found my expenses for manufactured feed cut in two, and instead of keeping eight pigs to kill in December I was fattening twenty-five; and, with two broods just littered, the number was raised to forty-six. Again, I find that I am getting 8 to 10 lb. of milk more per cow per day than was the case one year ago; so I feel that several benefits are being realised from the experiment.

But then I am told by a certain experimental station that "it is unthinkable that the stover, after removing the ears, is as good as green corn ensilage." My own experience is directly antagonistic, and the results in harvesting, feeding, and returns are greatly in favour of this experiment.

Facts are stubborn things, but my observation among farmers in several foreign countries and a goodly experience in my own have left no bigotry in me, and I am open to conviction if there is a better and more economical way.

On the second subject,

HOW TO CURE OAT SMUT,

A farmer writes:—Are we going to treat our grain to prevent the growth of smut this spring? Last season we treated our oats with formalin according to the rule established for such: 1 lb. of formalin (40 per cent.) to 45 gallons of water. The solution was put into 45-gallon barrels, filling them about half full. The oats were put up in gunny sacks, and submerged in this solution for about twenty minutes, then lifted out and allowed to drain from five to ten minutes, after which they were spread upon the floor to partly dry before sowing, which was done from twenty-four to thirty-six hours after treatment. In the meantime they were shovelled over a few times to prevent heating, and to facilitate drying. One-half of a 24-acre field was treated according to the foregoing, and the remainder as follows:—Spreading a thin layer on the floor 3 or 4 inches deep, then sprinkling them thoroughly with a sprinkling can filled with the formalin solution, then adding another layer and sprinkling as before, and so on. The object is to have them thoroughly soaked with the solution. The results obtained from the last method appeared to give as good effect as the former, yet I believe the first method is the proper one. Care should be observed in sowing to see that the proper quantity of seed is being sown to the acre. We allowed a ½-bushel per acre more seed than in sowing to make up for the dampness and swelling of the seed; still it was not enough, and we had to resow a portion of the field to get the required amount to seed per acre. Our field for oats was comparatively free from smut heads, only a few heads being noticed, and yielded over 60 bushels per acre. The seed was dark with smut before treatment, and smut had been on the increase for the past few years. It was an object lesson to see this field of grain lying by the side of other fields where the seed was not treated, and see from 5 to 10 per cent. of the plants bearing worthless smut heads, and the other free from such. The formalin cost us 50 cents (2s. 1d.) per lb. at the drug store; we used 2 lb. on the 75 bushels of seed, and had a large quantity of the solution left. Allowing that we increased our crop 5 per cent. in the yield, which is a low estimate, at present prices of oats this would amount to 1 dollar (4s. 2d.) per acre, or 24 dollars (£5 16s. 8d.) for the twenty-four acres. Does it pay?

HARVESTING BROOM CORN.

To ensure a good sample of brush, it must be cut at the right time, and that time is when the blossoms fall off. The seed should not be allowed to form. If this is neglected and the plant allowed to go to seed, the brush will be too brittle for broom maker's use. There is a great deal in the colour of the brush. We lately saw a splendid crop of broom corn at the Agricultural College, and it had just arrived at the proper stage for cutting. This should make a good sample of good colour when cured. A light, lustrous green is the approved tint of cured brush. Mr. D. Jones, in his article on the cultivation of broom corn in this *Journal* (October, 1899), says that care must be taken to avoid heaping the brush in quantities, as it will sweat and become discoloured, especially if cut before the seed is matured. If the bush is left exposed for any length of time to the strong rays of our summer sun, it will become brittle and lose colour. It should be handled and cured under shade, spreading it evenly to a depth of 6 inches over wire netting. It generally takes about four days to cure. To remove the seeds several methods are employed, but the small grower can do this by means of a curry comb, saw teeth, or a steel comb. A very primitive appliance is a cleft stick driven into the ground, and the brush is drawn through the cleft. An acre, properly cultivated, should yield about 500 lb. of cured brush. In the United States, the average yield is about 600 lb. per acre.

A VALUABLE TANNING SUBSTANCE—GAMBIER.

Taking it for granted that information upon any additional product to those already under cultivation by tillers of the soil in Queensland would be acceptable, the following brief notice on "gambier" is offered:—Gambier is the product of the Rubiaceous plant, *Uncaria Gambir*, by Mr. J. Bailey, Assistant Colonial Botanist, and for which there is a large demand in Europe and America, where it is considered a valuable tanning material. The plant is naturally a rampant climber, but in cultivation can easily be kept within bounds by planting in rows, say, 8 or 10 feet asunder, and allowing 6 feet between the plants in the rows. Like all other crops, weeds or other plants should be prevented from interfering with them. A plantation which is said to last about ten years is generally cropped after about eighteen months, the cropping being repeated as much as four times a year. The expense of growing, gathering, and manufacturing seems slight compared with many other products, thus it would be worthy of the attention of cultivators. The importation into Great Britain from the Straits Settlements and Japan is given as about 20,000 tons per annum. The cultivation of the plant is principally carried on in these countries, but was tried in the West Indies some time ago, and according to a recent issue of the West Indian *Bulletin* another trial is being made to bring it again into cultivation on account of the commercial value of the product. This seems an apt opportunity of asking, "Why is this not produced in Queensland?" In the West Indies, where the climate has hitherto not proved entirely favourable to its cultivation, we hear of endeavours being made to cultivate it; while in Queensland we have an indigenous *Uncaria*, which was first recorded for Australia in my report on the Bellenden-Ker Expedition in 1889. On my return from this expedition I submitted some leaves of this species to Dr. T. L. Bancroft for examination, and he found them to contain gambier, like *Uncaria Gambir*; thus we are sure of our climate being suitable, and, if upon trial, the native is not so productive as the Indian plant we could easily introduce the latter.

Bentley and Trimen, in their "Medicinal Plants," give the following mode of preparing the products:—" . . . Gambier is prepared by boiling the leaves and young shoots in water until their astringency is extracted; the decoction is then said to be evaporated to the consistence of a thin syrup and put into buckets, and when sufficiently cool stirred in the following manner:—The workman pushes a piece of soft wood in a sloping direction into each bucket, and, with two buckets before him, he works a stick up and down in each. The liquid thickens round the stick, and the thickened portion being constantly rubbed off, while at the same time the whole is in motion, it gradually sets into a mass, a result which, it is affirmed, would never be produced by simply stirring round. The thickened mass, which is of a light yellowish-brown colour, like clay, is then placed in shallow square boxes, and when sufficiently hardened is cut into cubes and dried in the shade." *Planting Opinion*, Madras, 1902, quotes prices realised on spot from 36s. to 42s. 6d. per cwt.

The principal use of gambier is for tanning, but it is also employed as a dye, and sometimes in medicine, having valuable astringent properties.

THE COMING WHEAT HARVEST.

A contemporary gives the following forecast of the probable yield of wheat this year:—"The average wheat yield for Queensland for the ten years ending 1901 was 15·2 bushels. Say we allow 15 bushels per acre for the coming harvest, the yield of the present crop from 150,000 acres should reach 2,250,000 bushels. The prospects are, however, so excellent that we are justified in anticipating as good an average as that of 1901-2, which was 19·4 bushels per acre. With such a yield our next harvest would produce 2,850,000 bushels. But putting the yield at 17 bushels per acre, we may reckon on a total yield of 2,550,000 bushels." We sincerely hope that our contemporary is right, but we prefer to take the lower figures for the present.

CORN-BREEDING.

Corn-breeding is a modification of live stock breeding, and follows the same general laws and principles. It is the application of principles of plant and animal breeding to the corn plant. The per cent. of sugar in the sugar beet has been increased from 3 per cent. to 16 per cent. The ordinary beet was improved by seed selection, so that an enormous industry has been built up and a new source of sugar given to the world. This has been done with a plant which seeds once in two years. Corn produces a crop every year, a single seed producing a return of over a thousand fold. From this great number of offspring, varying in size, shape, colour, and composition, a selection can be made which will develop any feature of the seed or plant. By continued selection these valuable attributes can be fixed in the characteristics of the plant, and the usefulness and importance of the crop increased. To illustrate the point: We have been able, by selecting ears having long shanks, to increase the length of the shank nearly 2 feet in every year's selection. By selecting ears with tall stalks, we have been able to increase the height of the stalk almost 3 feet in five years. By selecting ears from plants having wide leaves, we have been able to increase the average width of the leaf, and by selecting ears from stalks having narrow leaves, we have been able to decrease the width of the leaf.

In breeding corn, a small field is used. The land is prepared and the seed bed treated as for the ordinary field. They are usually about 120 hills long and 30 rows wide. Each row is planted from a separate ear. The barren stalks, poor stalks and all undesirable stalks, such as suckers, are removed before the tassel appears. The field is protected or isolated, so that no mixture can take place from other varieties or from any source. In the fall, these rows are husked separately, and the seed for the next year's crop is selected from the rows giving the highest yields per acre, of best composition, with the least barren stalks, and of the best type. In this way, the yield per acre of the variety is increased, the quality improved, and the type preserved and developed. By this plan, we are able to give personal attention and direct selection to the individual stalk and ear, which would be impossible in a large field. (From "Marvels of Corn Culture," in the May *Cosmopolitan.*)—Ex.

CHARLOCK SPRAYING—THE LESSONS OF 1902.

To the urban mind the spectacle of a young wheatfield resplendent with the bright yellow flower of the charlock plant, with the green of the crop to show it off to advantage, is no doubt a pretty sight, but to the agricultural mind nothing can be more deplorable. Charlock, like any other plant, cannot grow without nutriment, and it is equally certain that what is used by the weed is lost to the cultivated crop. Added to this is the fact that where the charlock is, a useful crop cannot also be. All weeds are to be condemned for the same reasons—that they are useless matter in the soil, and hinder the growth of legitimate plants—but the unsightliness of charlock, patent to the whole district, is an additional affliction to the good husbandman. Until comparatively recent years the hoe or the more drastic method of hand-pulling were the only means at the farmer's disposal to combat this insidious pest. A new era was opened, however, with the discovery of spraying as a means of killing the plant, and now every farmer who has been harbouring the weed has it in his power, with a moderate amount of luck, to bring about the destruction of the weed at an early date.

No one has done more in the development of spraying in connection with agriculture generally, and of charlock particularly, than Mr. G. F. Strawson, who, by the improvement of machinery, demonstrations, &c., has done much to draw attention to the new weapon ready to the hands of farmers. For some time his work, like that of others engaged in the task, had necessarily to be experimental. Now, it is rather corroborative and explanatory, for his fourth annual report on the destruction of charlock, like the third, adds little new to our knowledge of methods, but is useful in corroborating what had been previously discovered from a large series of trials. "The strength and quantity of the solution to be used and the most effectual time to destroy the weed have been thoroughly established."

WHEN AND HOW TO SPRAY.

The process of spraying with a properly constructed machine is simple, and the only question where judgment is required is when to spray. This has now been definitely decided. Of course, it is possible to destroy charlock at any time of its growth, but the measures may have to be so drastic in the case of strong plants that the crop suffers considerably. On economical considerations, it is necessary to "catch them young," and it is mistaken policy to wait until the plants are at or near the flowering stage. A paragraph in the report is as follows:—

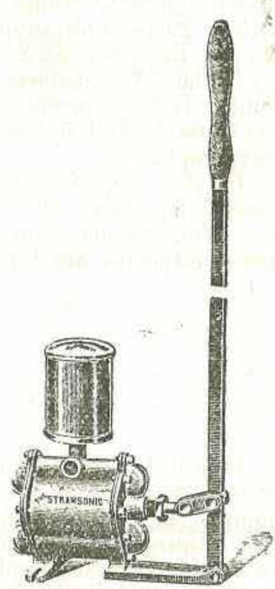
"Fifty gallons of 3 per cent. solution, favourably applied to young plants, will destroy 95 per cent. of the weed in an average infested crop; in fact, it will destroy all except those few plants that are shaded by other leaves from the spray, and this quantity and strength will affect the corn crops so slightly that an increased yield of corn, more than sufficient to pay all the expenses of spraying, may with confidence be looked for."

Mr. Strawson thinks that, now that the knowledge of spraying is so general, further public demonstrations are unnecessary, and points out several drawbacks to such. A day has to be fixed, and it is problematic whether the conditions will then be favourable both as regards the development of the weed and the caprice of the weather. Still, in spite of this modest disclaimer of the value of these demonstrations, there is no doubt they have contributed greatly to the knowledge of, and the trust in, spraying as a means of destroying charlock. The farmer, however, is much better situated, for he can attack the plant at the right moment and when dry, and unless he is unfortunate enough to have heavy rains immediately after—a point, unfortunately, not even he can arrange—he may look forward with confidence to good results.

TESTS AT HOME.

Every farmer can be his own experimenter in this matter, and Mr. Strawson makes a good suggestion to the sceptical, which may also be adopted as a demonstration. Leave a breadth of the field unsprayed, and mark the contrast at a later period.

For successful spraying, everything should be ready beforehand, so that a beginning may be made when the weather is fine. The material must be pure: 50 gallons of 3 per cent. solution should be used to the acre. The spraying should be done when the plant is young and in soft fibre, and large sprayers, with powerful pumps, are more successful than small machines. Apart from the removal of an eyesore, economic considerations demand the destruction of charlock, for the increased yield of grain makes the operation a profitable one. Charlock, insidious as it is, cannot stand the treatment long, and, though it may take a year or two to eradicate it completely, the money expended in its destruction will bear compound interest at a high rate.



PUMP USED FOR SPRAYING.

VALUATION OF ARTIFICIAL MANURES.

The use of artificial manures is becoming more and more in vogue in this State. Such manures are always analysed and sold on their merits, but it often happens that the results, when they are applied to crops, are not as satisfactory as was expected. On this point Professor Wrightson, in an English agricultural journal, the name of which we regret is missing from the article forwarded to us, says:—

Few questions are beset with so many difficulties as that of the comparative values of artificial manures. It is impossible to fix the value of a superphosphate, for example, without analysing the particular sample. It is also impossible to give an opinion upon the comparative value of "superphosphate," "basic slag," "bone compound," or a "complete manure" without a detailed analysis of each, and an elaborate calculation based upon the composition. Professor Aikman writes in his valuable work on "Manures and Manuring":— "For the purpose of affording data for ascertaining the approximate value of a manure tables have been drawn up giving what is called the 'unit' value of different manurial ingredients in various manures. This is obtained by dividing the market value of a manure per ton by the percentage of nitrogen, phosphoric acid, and potash it contains." Thus, if sulphate of ammonia of 97 per cent. purity contains 25 per cent. of ammonia, in order to obtain the unit value of ammonia in sulphate of ammonia we have only to divide the price per ton, say, £13, by 25, which gives the value per unit at 10s. 4·8d. In the case of superphosphates the percentage of tribasic phosphates which have been dissolved by acid represents what is called "soluble phosphate," which, in ordinary superphosphate, is present in the proportion of 25 to 27 per cent. At a unit value of 1s. 11d. the commercial value of a superphosphate containing 27 per cent. "soluble" would be 52s. 9d. per ton. Phosphates in basic slag are worth 1s. 2d. per unit, supposing the guarantee to be 37 per cent. of phosphoric acid, and the price £2 3s. per ton. The various values per unit of ammonia vary in the different classes of manures from 10s. to 11s. In the case of potash manures, such as muriate and sulphate of potash, the unit value of the potash is from 3s. 6d. to 3s. 10d. In phosphates, from 1s. 2d. in basic slags to 1s. 11d. in superphosphates.

In the case of "complete" manures containing all the ingredients of principal importance, the value would be found by adding together the units of each. For example, a manure of this nature containing 8 per cent. ammonia, 9 per cent. potash, and 9 per cent. "soluble" phosphates would be worth :—

	£	s.	d.
8 × 10s. 4d. =	4	2	8
9 × 3s. 4d. =	1	10	0
9 × 1s. 11d. =	0	13	3
	£6	5	11 per ton.

It will be seen that the relative values of manures depend upon the proportions in which the principal fertilising ingredients are present in particular samples. It is, therefore, impossible to state what is the precise money value of a manure, nor yet the comparative value of manures, sold under the description of superphosphate, basic slag, dissolved bones, bone compound, bonemeal, or "complete manure."

The above method of determining the value of manures by units is commercial in principle. The price of the unit must vary with fluctuations in the price of the manure, and hence units of potash, phosphoric acid, or ammonia may be purchased cheaper in one form than other. Thus in dried blood, containing 15 per cent. of ammonia and costing £8 per ton, the ammonia costs 10s. 7d. per unit, but in sulphate of ammonia of 97 per cent. purity, and containing 24 per cent. of ammonia, it is bought at 9s. 7d. when the price per ton is £11 10s., but not if the price is £13 per ton.

INTRINSIC VALUE.

The value of a manure must depend upon its effect rather than upon its price. It is comparatively easy to fix a price according to what the same ingredient can be purchased at in similar manures. Thus a phosphatic manure in which the soluble phosphates are above current prices must be considered as dear. The absolute effect of manures or, in other words, the real and intrinsic value is a much more difficult problem, depending upon the soil to which a manure is applied and the crop for which it is used. Seasons also affect the usefulness of all manures, but it is scarcely fair to introduce the vagaries of season in fixing upon the relative value of rival fertilisers. It is, however, evident that a soil may be greatly benefited by an application of phosphates or

Plate XIII.

EXHIBIT OF BIGGENDEN STATE FARM AT THE MARYBOROUGH SHOW, 1903.

of ammonia, and that it may not derive any benefit from potash. The reverse may also be equally true if a soil is rich in phosphates and nitrates, but is extremely poor in potash. The question is further complicated by the "condition" of the soil, for it is well known that, if a heavy dressing of dung has been recently applied, the effect of artificial manures is often small. In order to obtain the full advantage of any manure, it is, therefore, necessary to take into account both the natural character and the condition of the soil. Equally important is it to consider the requirements of the crop, because a manure rich in phosphates may produce but little effect on wheat, but a great effect on swedes; also, a mixture of nitrogen and phosphatic manures will probably produce much more effect than either used separately.

Professor Aikman, in the work above referred to, says:—It is impossible that every farmer should be able to support an experimental station. . . . Nevertheless, it is possible and highly desirable for every farmer . . . to carry out simple experiments for the purpose of ascertaining the characteristic manurial requirements of his soil. . . . It is desirable, in order to minimise experimental error as much as possible, to carry out the experiments in duplicate or even triplicate. . . .

In carrying out these experiments, care should be taken not to have the plots *immediately* adjoining one another, as the manure applied to one plot may, by soaking through the soil, affect the result on the adjoining plot. . . . In order to make such experiments as valuable as possible, they ought to be continued year after year. At the conclusion of the experiments, the produce obtained from each plot should be carefully weighed.

EXHIBITS AT THE MARYBOROUGH SHOW.

THE BIGGENDEN STATE FARM.

The exhibit from the Biggenden State Farm has been a specially attractive and instructive feature of Maryborough Shows for some years past, but this year the State Farm has excelled itself, which is saying a great deal, and reflects the highest credit on the manager, Mr. G. B. Brookes, who has spared no pains in making the trophy one that would catch and captivate the eye of every person who entered the building. It was a theme of genuine admiration all day. Mr. Brookes is endowed not only with the ability to grow things, but with artistic taste and good judgment in displaying them to the best advantage. On the wall is a very striking arrangement of cereals and other plants, while on the terrace of shelves below there is a rich show of the well-grown products of the Biggenden State Farm. Very interesting at the present juncture, when we hear so much about the revival of cotton-growing, are the samples of cotton grown on the farm, some nine distinct varieties, and all of very good quality. Cassava roots are shown, with a sample of the tapioca produced from them; and the same with arrowroot. The cauliflowers exhibited are said to be the best in the show, and certainly would be hard to beat. The special feature seems to be the successful growing of various plants, vegetables, grasses, and other plant life of commercial value which are not generally grown for the market, thus demonstrating what things not previously tried are capable of being successfully grown in this district. The collection of vegetables and tubers of all kinds is simply superb, while the now famous *Paspalum dilatatum*, also the Mitchell grass, and genuine (growing) saltbush of the far West are interesting objects. It is a very beautiful display, and one of which Mr. Brookes has every reason to feel proud.—*Maryborough Chronicle.*

Dairying.

THE BREEDING AND TREATMENT OF DAIRY CATTLE.

By W. SMITH, Manager, Yangan Cheese Factory.

(Paper read before the Danderoo Progress Association.)

The success and enjoyment of a dairy farmer—the latter depending on the former—are in no small degree the result of his skill and judgment in selecting, to begin with, and in mating together for breeding purposes the animals of which his dairy herd is composed. First buying some, and then breeding all he needs, breeding them up to a model framed in his own mind. In some men this skill is a natural gift which is generally improved by thought and experience. Others work it out for themselves, without having been born with any great natural talent in that direction. Yet others there are who do not acquire it, and do not even try, and in these cases no progress is made and no success attained, and so it is that, so far as quality is concerned, we find in many districts a great difference in the cattle that are bred.

There was a Mr. Blackwell in England, whose reputation stands to the effect that he had a marvellous natural and cultivated talent for mating animals together in such a way that faults of dam or sire were reproduced in a diminished degree, or not produced at all in the offspring; while at the same time the good points of either or both were not only preserved, but also developed. It was a natural gift in this man, and he worked it out with wonderful success in a period when the art of breeding was not popular and understood as it has since become. He took in hand a breed of cattle—the Longhorns—whose greatest fame both rose and fell with him. He was even more successful with the Leicester sheep, and his rams fetched prices which astonished the world. His success in cattle-breeding would no doubt have been as marked and brilliant as it was in the domain of sheep, if only he had taken in hand the Shorthorns instead of the Longhorns This, however, was a matter of circumstance rather than choice; the Longhorns were in his day the prevailing bovine stock of the Midland counties, and he took in hand the material lying nearest to him. But to him belongs the underlying credit of having given to stock-breeding, just at the period when it became imperative, that impetus which sufficed to lead up to the splendid results of to-day. He had a theory of breeding, no doubt, and that he should have left no record of it is a fact greatly to be deplored by every breeder who has succeeded him. Yet at the same time others copied willingly, so far as he was concerned, the arts by which he succeeded; and of those who paid him visits for the purpose, Charlie Colling has left the greatest name.

IMPROVING BREEDS.

The question of heredity as epitomised in the word "pedigree" is of the greatest possible importance in the art of breeding and improving animals of any kind. Heredity includes good and bad qualities alike, which are transmitted from parent to offspring, and the art of breeding consists quite as much in wiping out bad qualities as in developing good ones. A fault of form, for example, which is hereditary in any given cow, may be improved away by mating her, and also her female offspring through several generations, with bulls bred from families of cows in whom that particular fault does not occur. Faults, too, of colour, of constitution, of size, of bone, of milking properties, or of almost anything else, save perhaps of actual and positive organic diseases, may similarly be disestablished by breeding against them through several generations. But at the same time it must be borne in mind that, while these faults cannot be considered as having been finally wiped out until three or four generations have shown no tendency to revert to them, it is only to easy to reintroduce them by using a bull from a herd in which they still exist. There is, unfortunately, a tendency of this sort in the animal world—a tendency to return to bygone types or peculiarities, many of which, if not all, are undesirable, and a breeder cannot be sure that he has completely mastered it until he has seen no evidence of it in the last three or four generations of his cattle; even then it required to be guarded against just as carefully as it was fought against, in order to prevent its reintroduction.

It has been found by Charles Darwin, the greatest naturalist of all time, that crossbreeding gives a more or less definite impulse towards characters long before lost or got rid of, and the introduction of fresh blood, especially if it be entirely unrelated, though of the same species or breed, may be easily followed by the restoration of some earlier and improved type. This is the danger which breeders have sought to avoid by breeding in and in, as the constant mating of closely related animals is termed. But while there can be no doubt of the success of this line of breeding in the object desired, there is the danger of infertility and tuberculosis if the line be followed very far.

Purity of Breed.

But, on the other hand, purity of breed may be maintained without necessarily increasing the danger of developing disease and destroying fertility. Fresh blood repeatedly introduced is necessary in order to avoid the danger spoken of, but it must be blood of the same strain and tribe if purity of breed is to be preserved The danger only exists when closely-related animals—males and females of the same herd or family—interbreed generation after generation, to the exclusion of outside relations. But in most of our distinct breeds of cattle, and particularly in the Shorthorns, there are many pure-bred herds of one particular strain or other—of Booth or Bates blood, for example—and these herds can supply to each other all the fresh blood that is necessary to preserve the vigour and soundness of cattle. And, indeed, if such fresh blood of the same strain be introduced from other soils and climates, and even from other countries rather than from the same neighbourhood, the benefit will or may be all the greater. But in any case it is generally an advantage to get bulls from the South. Most of our various breeds of cattle have now been bred towards a given model for each breed, wherever any pains at all have been taken. The approved model of a Shorthorn, an Ayrshire, or a Jersey, for instance, is well understood, and all breeders of note have aimed at this model, so that there is no great difficulty in getting all the fresh blood required, without incurring danger to the model.

A Good Bull.

It has been truly said that the bull is half the herd, and it is therefore of the greatest importance that only good bulls should ever be allowed to propagate the species. But what is a good bull? A well-formed, well-grown animal, of good colour and constitution, is not by any means necessarily a good bull, though a good bull must possess these qualities. The capacity of a bull to transmit to his offspring his own peculiar properties or mould of excellence of any kind depends on his having inherited them from a succession of ancestors endowed with similar characteristics. There is many a good-looking bull not true bred as to qualities, whose power of impressing his good looks or other points of merit on his offspring has been found false, and this for two reasons—viz., his lack of prepotency, and the fact that his own ancestors have been bred in the happy-go-lucky manner so common in the country. Such a bull, if he has a promising appearance, is, so far a fortunate accident of nature, but there is no certainty whatever that his offspring will be as good looking as he; the certainty indeed is that he will not, if there is any certainty about it. On the other hand, it occurs often enough that thoroughly well-bred bulls, and cows too, do not show up as well as they ought, or as they were reasonably expected to do, and so far are not ornaments of the families to which they belong. Yet animals like these are always worth buying at the moderate prices to which their want of good looks has consigned them. They are worth buying because their want of good looks, being merely an accident of Nature, they will in all probability produce offsprings much better looking than themselves. This sort of reasoning is applicable not only to looks, but to qualities too, as a general thing. The rank and file of dairy farmers cannot well afford to buy the good-looking young bulls that fetch fancy prices, or used to fetch them, and indeed they may rest content as a rule with the plainer sires, for these will probably nick in with their cows just about as well as the others. But in respect of either sort, it is a *sine qua non* that the bull should have a healthy and vigorous constitution and not have been pampered or coddled at all, but just brought up on plain food and in a hardy sort of way as to general treatment. In any case the greenhouse way of rearing young bulls is played out, once and for all, so far as practical dairy farmers are concerned.

PEDIGREE BULLS.

The sorts of cows that dairy farmers should aim to breed are those which possess milk, size, condition, and good looks. These are the qualities that command a good price in the market, and dairy farmers must needs be always breeding and always selling. Pedigree herds are the "upper ten" of bovine society, and dairy farmers, who are in business for profit and not for a hobby, cannot afford to have much to do with them. Indeed, pedigree bulls are sometimes a delusion and a snare when brought into an ordinary herd. I have known two marked instances of this. One of these bulls got very few calves, and those not very good ones; others get plenty—too many, in fact—and scarcely any of them were equal to their mothers. This last one, indeed, very seriously lowered the quality of a high-class non-pedigree herd, which belonged to an old friend of mine who is now gathered to his fathers. But, on the other hand, I have known a case where a pedigree bull had qualities so marked and commanding that his impress was clearly enough seen for many generations among the cattle of the neighbourhood. All this is a lottery, as matrimony is said to be. It would, however, be much less of a lottery if those who buy bulls, be they pedigreed or not, would take sufficient pains to assure themselves that the qualities they want in the bulls are hereditary, and not merely accidental. In order that the bull may improve the herd, he must needs come of a family which has long been noted for soundness and vigour of constitution, otherwise he will not influence the offspring very much to their advantage. But if he possess that strength and soundness and vigour, his influence will be seen in many generations. This, indeed, is prepotency, and comes, like other functions, within the meaning of heredity.

CROSSING.

The offspring of a cross between two animals of the same breed, but not of the same family, or even related in blood, is generally strong and vigorous—sometimes more so than either of the parents, whereas, on the other hand, close inbreeding tends towards delicacy of the constitution, and weakens some of the functions. From this latter condition of things it is easy to develop the disease known as tuberculosis. This, however, is not exactly "crossing" in the ordinary acceptation of the word Intercourse of a sexual nature between animals of distinct breeds—as between Shorthorns and Ayrshires, or Ayrshires and Jerseys—is essentially crossing, and the offspring of a first cross of this sort is usually a most vigorous and healthy animal, if neither of the parents is diseased. In any case, the breed from animals that are diseased or unsound in any respect is, to put it mildly, a mistake. Such animals should not be allowed the opportunity of procreating, for unsoundness is distinctly hereditary, and disease in a parent will commonly reappear in offspring. It seems to be well established that Nature looks with approval on blood-mixing within the limits of a given species, rather than on the family exclusiveness, which, in the breeding of pedigree stock, has been too frequently promoted. This refers to the animal world in general, including man himself. How far the greatness of the British race is owing to the fact that "Saxon and Norman and Dane are 'we,'" as Tennyson puts it, I will leave others to say, but the fact remains that, as a nation, we are considerably mixed in blood. This suggestive illustration may serve as a point of study in the breeding of domesticated animals, and I may refer to the Shorthorns by way of analogy. One of the most successful dairy farmers I have known followed a plan of breeding, which is worth relating, and found it answer his purpose thoroughly well. He never bred any cows for his own dairy, but bought as many promising heifers as he wanted of the ordinary Shorthorn breed year after year, and had them put to a pedigree bull. This bull was always a thoroughly good one, but as a matter of preference did not come from a milking family. This prepotency showed itself in the calves, which ran to beef at an early age, and were almost invariably fed off for the butcher, while still they had their calf-flesh upon them. This sort of thing cannot be generally followed we know, but it is an instance remarkable in its way of breeding for a special and intelligible purpose. When it is desirable to feed off animals in this way for the butcher, it would be false policy to let them lose their "calf-flesh," as it is termed—that is, these young animals ought to be kept steadily and rapidly progressing towards maturity from their birth; and, when female calves are reared for the dairy herd, it is also advisable to keep them steadily progressing, but not so rapidly as in the other case. There is and can be no advantage whatever deserving the name in letting young store cattle down into the lean, half-starved, unprogressive condition, which is far too common in the land. The true and sound policy is to keep them thriving all the time, rapidly when for the butcher, and slowly when they are for the herd.

GENERAL TREATMENT.

We may say, then, that if cows are exposed to bad weather of any sort, particularly to cold combined with damp, a waste of food is invariably involved; so also if they are chased about by dogs or flies or men, or if they have to travel too far in search of food and drink. All is done at the cost of food, for the consumption of carbon is excessive in these cases, and the cow will lose flesh and give less milk, the quality of which will be reduced, if she is not treated upon what are called humanitarian principles. A cow that is starved of food or deformed by dripping rains, and withered by a frost, cannot be said to have even common fairplay, and can do but little credit to herself in the way of yielding a profit to her owner. Instances may easily be found in every district, showing the effects of feeding and treatment of dairy cows. In one instance, we may see a prosperous man, who, in feeding his cattle well, enriches his land; the land responds to this, and, in turn, feeds his cattle more liberally, maintaining a larger number of them than it would at first. In another, we find the lean cattle and impoverished land, which lead in the end to poverty. I knew a man once, who was notorious for starving his cattle and neglecting his land, though he was the owner of both. If he ever bought feed for his cattle, he did it so by stealth, for nobody heard of it. His cattle were so lean and weak in the winter that they could hardly get up without help, and sometimes couldn't with it; his land got no help, and it starved his cattle in summer; his fields threw a scanty crop that was deficient in nutriment and so forth. Well this man never prospered, never flourished, and he died as he had lived, in something very like poverty, which might just as well have turned to plenty. Lastly, there is the question of gentleness in the treatment of cows. There are, indeed, few cows who are not susceptible to treatment of this sort, they became gentler themselves in response to it, and yield more milk. Cottagers' cows generally do better for their owners, because they are commonly tendered by women, and women, as a rule, are gentler and kinder than men. A man who kissed his cow has been often cited, and the Austrian hussar his horse; these kisses matter but little in themselves, but they are the outward and visible signs of inward and spiritual kindness and gentleness. These it is that are so beneficient in the treatment of cattle.

SWINE FEVER AND TUBERCULOSIS.

The prompt action taken by the Stock Department for the eradication of swine fever has, we have every reason to believe, been crowned with complete success. It devolves now upon pig-breeders to second the efforts of the Department by taking care that the animals are kept under such sanitary conditions as will prevent any future outbreak of swine fever and tuberculosis. There still lingers in the minds of some conservative farmers an idea that pigs should always be kept in sties, and these sties are generally in such a condition as to favour disease. We have written exhaustively on "Pigs and their Management," and have always impressed upon our readers that the pig is, by nature, a clean animal, not the unclean beast he is generally considered to be. It is the faulty housing and treatment and bad and dirty feeding that causes the unfortunate animal to be thus stigmatised. It must, however, be considered that the majority of breeders are alive to the fact that it is a grave mistake to pen up pigs and keep them penned up from the time they begin to feed themselves until they are ready for the butcher, or for breeding purposes.

Now-a-days pigs are usually allowed to roam over paddocks and to pasture on grass or other forage crops. The sties are being increasingly used merely for breeding purposes, as may be seen at the Queensland Agricultural College, where the animals are allowed to wander over a large area of grass land, or are kept intermittently in large yards, where the utmost cleanliness is observed. The same may be observed in the roomy sties in the piggeries where the breeding sows and their litter are kept and cleaned and fed like horses in a stable. If this plan were carried out by all farmers, we should hear very little of swine fever. We quite understand that it might not pay farmers to erect fine buildings such as are seen at Agricultural Colleges, but there is no need for a pigsty to be constructed of expensive material and of elaborate design. All that is required is that it shall be protected from rain and sun, and be properly ventilated, be fairly roomy, and kept scrupulously clean. The food should be sweet, wholesome, and plentiful, and clean water should always be provided for them.

We may here draw attention to a statement by Mr. John Reid, of J. C. Hutton and Co., Zillmere, concerning the class of pigs now being bred in a certain district near Brisbane. Mr. Reid is an expert in the curing of bacon and ham, and his opinion on the kind of animal which will yield the best of these commodities is of value. He says that the pigs in that district are too short in the side, and attributes this fault to inbreeding. As a remedy he recommends the introduction, amongst the herds, of York boars. We give this matter publicity, as the pig-breeding industry is a most important one, and every effort should be made to breed only the best of any breed.

CATTLE IMMUNE TO TEXAS FEVER.

The systematic work that is being done at various places in the breeding or selection of plants resistant to disease has been made the basis of a suggestion by the American Department of Agriculture that something might be done also with animals in producing strains more vigorous or more resistant to disease. Some recent experiments in Algeria, involving attempts to combat Texas fever, have an interesting bearing upon the subject. In the search for some bovine animal which was immune to Texas fever, it was found that both the buffalo and the zebu were naturally resistant to this disease. The buffalo could not be crossed with domesticated cattle, but it was found that the zebu crossed readily with such, and that all hybrids thus obtained were perfectly immune to Texas fever. The female hybrids between the zebu and domesticated cattle proved to be very fertile, whilst the males were well adapted to the production of beef or to doing work of various kinds. The hybrids grew to a weight of close upon 800 lb. at the age of three years, and the dressed weight of the carcass averaged about 62 per cent. of the live weight. The large hump of muscle and fatty tissue situated over the shoulders of the zebu to a great extent disappears in the hybrid, whilst the bones are unusually small and delicate, and the meat is said to be of good quality. It is asserted that the milk of the zebu or of the hybrid is richer than that of the ordinary Arabian cow, and that whilst the zebu gives from six to eight quarts per day the hybrids yield from fifteen to sixteen quarts. Three different races of zebus have been introduced into Algeria—from Madagascar, Cochin China, and India respectively. The third or Brahmin race is the only one which proved to be of economic importance, and is the one from which the present zebus and hybrids of Algeria have descended. The foregoing results are borne out by experience in Jamaica. Texas fever is very prevalent in that island, but it has long been known that cattle which contain a strain of zebu blood are immune to the disease. This zebu blood was introduced years ago for another purpose, but it is now proposed to import a number of zebu bulls from India for the specific purpose of securing immunity to Texas fever. These are to be used in connection with the improvement of the common cattle of Jamaica. It may be added, as a matter of interest, that some years ago a cross was effected in Ireland between a zebu bull and a Dexter cow. The product of this cross was exhibited in the Zoological Gardens, Dublin. It was a heifer in which the hump over the shoulder, characteristic to the zebu sire, had quite disappeared.—*Weekly Times.*

ANGORAS AND MOHAIR.

The great authority on Angora goats in California shows how the introduction of the Angora goat to Cape Colony has raised the production of mohair in a few years to an equality with that of Asia Minor. The consumption of mohair in America last year exceeded 5,000,000 lb., and the local herds only furnished 1,000,000 lb. The consumption of mohair, he says, is increasing faster than the home supply, and the probabilities are that it will be a long time before the American breeders can get goats enough to furnish their own mills with what they require.

WHAT HOVEN ARISES FROM.

Hoven, blown, or "the blast" in cattle occasionally arises from impaction of dry foods, but much more often from a sudden change to abundant green food. Clover more than any other plant is disposed to blow stock up suddenly. Escaping from a bare pasture into a field of clover heavy with dew, young animals will get blown in a surprisingly short time, before it would seem possible to have gorged themselves. The luscious food is "twisted down their necks" without that important process of insalivation in the mouth so necessary for perfect digestion in man and beast. The gases eliminated consist chiefly of carbonic and sulphuretted hydrogen, which, in the writer's experience, extinguish a lighted candle, but they are not constant in their proportions, and it may be true that in some cases the voided gas through a punctured flank has been inflammable.

If the gases were constant it would be easy enough to provide a chemical antidote. If CO_2 (carbonic acid) were brought into contact with a dose of liquid ammonia, then would result carbonate of ammonium and water (H_2O), which would occupy but a minute space in the stomach, in lieu of the great volume of gas which had previously distended the organ. To the student of agricultural chemistry familiar with the decompositions which the above statement suggests, the theory of a chemical antidote is very attractive, but, like many other things learned in the laboratory or the class-room, is not found to "pan out" satisfactorily. It is, however, worth bearing in mind as one of the remedies for hoven, and with care to administer it very much diluted, and preferably in the form of sal volatile, which is an aromatic spirit of ammonia in which essential oils are blended.

REMEDIES TO USE.

The best of all remedies is linseed or olive oil in fairly large quantities—anything from ½ pint to 3 pints for a beast. The remedy was probably invented by some salad eater who had realised from experience that he could distend himself with green foods without distress if he took "salad" oil with it. It masks the gases or prevents them from getting free, and has a disposition to dissolve or appropriate them.

The question is asked, Should a blown beast be walked about? I should say yes, unless he is at the point of suffocation, when I should stab him in the side with the first thing that came handy. An irrepressible joker who came to me as a pupil discovered how to play a tune on a tin whistle by inserting the mouthpiece and fingering it in the usual way. It is noticed that blown animals eructate and obtain some slight relief that way, but after a time they cannot do so; so long as they are able to get rid of any wind that way walking about will help it, and if there is no immediate danger puncture of the flank should be avoided or the passing of a probang, for neither practice is wholly without risk. The probang will in some instances permit a lot of gas to escape, but too often it becomes choked in the first minute, and withdrawing and passing it again is liable to injure the gullet.

The left side, midway between the point of the hip and the last rib, is the place to puncture, if required; and every young farmer and stockman should have the position pointed out to him while there is nothing the matter and he is not "flurried." The incision should be made in a somewhat downward direction, and in one bold stroke right through the abdominal muscles into the rumen. This is really the simplest of operations, and for want of the information here offered many and many a good bullock has been lost. This is the sort of "first aid" or veterinary lecture which would benefit farmers if a man were sent round to teach it. While your veterinary surgeon is being summoned two or three promising youngsters may be dead, because you had not the confidence to stab the ailing beast in a safe place.—"Vet.," in the *Farmer and Stockbreeder*.

ROCKHAMPTON AGRICULTURAL SOCIETY'S SHOW.

MILK AND BUTTER COMPETITION.

We have received from the secretary of the above society the results of the milk and butter competition at their recent annual show, as reported in a local newspaper. Owing to the large amount of space required for our report of the proceedings of the Agricultural Conference at Maryborough, this, as well as much other matter, has been unavoidably held over to the present issue.

The results of the butter competition at the recent show of the Rockhampton Agricultural Society presented in the following tables will be studied by enlightened dairy farmers with considerable interest. The system on which the prizes are awarded is that pursued by the British Dairy Farmers' Association and formed with the object of giving the honours to the best cow for dairymen and farmers engaged in butter-making. A cow which has been some months in milk is entitled to consideration, and points are allowed her on that account. That this is not the period when the largest returns are to be looked for is shown by as many as fourteen points being allowed Dairymaid in the competition. Milk grows richer towards the cow's period of lactation. Dairymaid's milk tested 5·8 per cent. of butter fat; while that of Buttercup, the latest calved cow, tested only 2·8 per cent. The aged cows competing have been in the show ring on former occasions; some youngsters were promising debutantes, of whom good things may be expected in future. Minnie won the prize for the largest quantityof milk in twenty-four hours. Her milk, however, was not so rich in butter fat as that of Rosebud and Dairymaid. There will be keen competition in future between Minnie and Dairymaid. Both are young animals, and to the Ayrshire blood another strain has been added which accounts for the richness of the milk. The winner, it will be seen, was Rosebud with a yield of slightly over 3 gallons of milk, which yielded 1·776 lb. of butter. This is not equal to Miss Hoyle's performance last year. She yielded 38¼ lb. of milk and 2·0095 lb. of butter. Rosebud's returns this year were 30½ lb. of milk and 1·776 lb. of butter. Miss Hoyle appears this year as Empress with 30½ lb. of milk and 1·649 lb. of butter at her credit. Violet and Beauty, which beat Rosebud last year, were not in this year's competition. The highest yield in twenty-four hours in a similar competition at the National Show in Brisbane last year was 1·51 lb. of butter. Four of the competitors here this year gave more than that. It is not fair to the young cows, however, to place them in competition with the aged cows. Now that the financial affairs of the society have received a fillip, the committee might consider the usefulness of offering a prize for three-year-olds. Doing so would induce dairymen to pay more attention to wellbred heifers and use scales and cream testers. [The Ayrshire Cow Derby is one of the most interesting cattle competitions in the United Kingdom, and Derbys are being introduced in other places. Rockhampton took the lead in the style of competition, and we should like to see the society institute a debutante Derby for three-year-old heifers at their show. The tables are as follow; all the cows are the property of Messrs. Archer Brothers:—

MORNING YIELD. EVENING YIELD.

Name of Animal.	Yield of Milk.	Percentage of Butter Fat.	Yield of Commercial Butter.	Name of Animal.	Yield of Milk.	Percentage of Butter Fat.	Yield of Commercial Butter.
	lb.	lb.	lb.		lb.	lb.	lb.
Rosebud ...	18	5·2	1·048	Rosebud ...	12½	5·2	0·728
Dairymaid ...	15	5·8	0·974	Empress ...	13	5·0	0·728
Empress ...	17½	4·7	0·921	Minnie ...	13½	4·8	0·726
Minnie ...	18	4·4	0·886	Bushranger ...	10½	5·8	0·682
Blackbird ...	14½	5·0	0·811	Brindle ...	10	6·0	0·672
Ladybird ...	14½	4·7	0·763	Spot ...	8½	6·6	0·628
Spot ...	14½	4·7	0·762	Dairymaid ...	7½	7·0	0·587
Bushranger ...	13	5·0	0·728	Ladybird ...	10	4·8	0·537
Brindle ...	12	4·7	0·631	Blackbird ...	10	4·8	0·537
Buttercup ...	14½	2·8	0·454	Buttercup ...	5	5·9	0·330

TOTAL YIELD.

	lb.	lb.		lb.	lb.
Rosebud	30½	1·776	Spot	23	1·390
Empress	30½	1·649	Blackbird	24½	1·348
Minnie	31½	1·612	Brindle	22	1·303
Dairymaid	22½	1·561	Ladybird	24½	1·300
Bushranger	23½	1·410	Buttercup	19½	0·784

JUDGING BY POINTS.

Animal.	Points for Time in Milk.	Points for Weight of Milk.	Points for Butter Fat.	Total Points.
Rosebud	9	30	35	74
Dairymaid	14	22	31	67
Minnie	4	31	32	67
Empress	4	30	32	66
Bushranger	8	23	28	59
Ladybird	6	24	26	56
Spot	6	23	27	56
Blackbird	5	24	26	55
Brindle	3	22	26	51
*Buttercup	1	19	15	25

* Ten points were deducted for being under 3 per cent. of butter fat.

THE COMPETITORS.

—	Breed.	Age.	Days in Milk.
Rosebud	Shorthorn-Jersey	8	137
Dairymaid	Ayrshire grade	9	186
Minnie	Ayrshire grade	5	82
Empress	Ayrshire-Shorthorn...	10	83
Bushranger	Hereford grade	11	126
Ladybird	Hereford grade	8	106
Spot	Ayrshire grade	7	102
Blackbird	Jersey grade	8	98
Brindle	Jersey grade	8	76
Buttercup	Ayrshire grade	8	54

The prizes, it may be mentioned, were £6 and £2 respectively, and the conditions of the competition were as follow:—The prizes to go to the cows which revealed the greatest merit in respect of (*a*) the quantity of milk, (*b*) the quantity of butter fat, (*c*) the ratio of milk to the pound of commercial butter—1 point to be awarded for every ten days since calving, deducting the first forty days, with a maximum of 14 points; 1 point for every pound of milk, taking the average of two days' yield. 20 points to be awarded for every pound of marketable butter indicated according to the Babcock test; and deductions of 10 points to be made each time the fat was below 3 per cent. Mr. E. B. Moyle acted as judge of the competition, Mr. H. T. Shaw as manager, and Mr. W. M. Standish as steward.

MILK TESTS AT THE SHOW OF THE ROYAL AGRICULTURAL SOCIETY OF QUEENSLAND, TOOWOOMBA.

5TH AND 6TH AUGUST, 1903.

FIRST DAY.

	Owner.	Name of Cow.	Lb. of Milk.	Per Cent. of Butter Fat.	Lb. Commercial Butter.
MORNING.	Mr. E. Bennett	Lass	26	3·0	·87
	Mr. D. Haydock ...	Ivy	17	2·2	·41
	Mr. A. Muirhead ...	Granny	32¼	3·1	1·11
	Mr. F. Drew	Milkmaid	18½	2·6	·53
	Mr. W. Brosnan... ...	Dolly	19¾	2·0	·44
	Mr. B. French	Nellie	19½	4·4	·96
	Mr. J. J. Carrigg ...	Smoker	19¾	2·4	·53
	Mr. F. Drew	Jersey Belle ...	15½	4·4	·76
	Mrs. Thompson	Berry	14¼	4·0	·63
	Mr. H. W. Bond ...	Rose	16	4·1	·73
EVENING.	Mr. E. Bennett	Lass	22¼	3·6	·89
	Mr. D. Haydock ...	Ivy	17½	6·4	1·25
	Mr. A. Muirhead ...	Granny	24¾	4·6	1·27
	Mr. F. Drew	Milkmaid	16	4·3	·77
	Mr. W. Brosnan... ...	Dolly	17	3·0	·57
	Mr. B. French	Nellie	13	4·9	·71
	Mr. J. J. Carrigg ...	Smoker	15¼	3·0	·51
	Mr. F. Drew	Jersey Belle ...	12	4·6	·61
	Mrs. Thompson	Berry	9½	4·8	·51
	Mr. H. W. Bond ...	Rose	10½	5·4	·63

Lass.	Ivy.	Granny.	Milkmaid.	Dolly.	Nellie.	Smoker.	Jersey Belle.	Berry.	Rose.
·87	·41	1·11	·53	·44	·96	·53	·76	·63	·73
·89	1·25	1·27	·77	·57	·71	·51	·61	·51	·63
1·76	1·66	2·38	1·30	1·01	1·67	1·04	1·37	1·14	1·36

SECOND DAY.

	Owner.	Name of Cow.	Lb. of Milk.	Per Cent. of Butter Fat.	Lb. Commercial Butter.
MORNING.	Mr. E. Bennett	Lass	25¾	3·2	·92
	Mr. D. Haydock ...	Ivy	17	4·2	·79
	Mr. A. Muirhead ...	Granny	31¾	2·9	1·03
	Mr. F. Drew	Milkmaid	17¾	3·0	·59
	Mr. W. Brosnan ...	Dolly	19½	2·4	·52
	Mr. B. French	Nellie	18¼	4·6	·94
	Mr. J. J. Carrigg ...	Smoker	19½	2·8	·61
	Mr. F. Drew	Jersey Belle ...	16	3·9	·69
	Mrs. Thompson	Berry	13	3·5	·50
	Mr. H. W. Bond ...	Rose	14¼	4·4	·70
EVENING.	Mr. E. Bennett	Lass	20¼	4·5	1·02
	Mr. D. Haydock ...	Ivy	11¾	4·4	·58
	Mr. A. Muirhead ...	Granny	25¼	4·4	1·24
	Mr. F. Drew	Milkmaid	14½	4·4	·71
	Mr. W. Brosnan ...	Dolly	15½	5·2	·90
	Mr. B. French	Nellie	12¼	5·6	·76
	Mr. J. J. Carrigg ...	Smoker	13	3·5	·50
	Mr. F. Drew	Jersey Belle ...	10¾	4·3	·51
	Mrs. Thompson	Berry	9½	4·3	·45
	Mr. H. W. Bond ..	Rose	8½	5·0	·47

Lass.	Ivy.	Granny.	Milkmaid.	Dolly.	Nellie.	Smoker.	Jersey Belle.	Berry.	Rose.
1·76	1·66	2·38	1·30	1·01	1·67	1·04	1·37	1·14	1·36
1·94	1·37	2·27	1·30	1·42	1·70	1·11	1·20	·95	1·17
3·70	3·03	4·65	2·60	2·43	3·37	2·15	2·57	2·09	2·53

Heaviest weight of milk—Granny, with 114 lb., first; Lass, with 94¼ lb., second.

RESULTS OF MILK-TESTING AT BIGGENDEN AGRICULTURAL AND PASTORAL SOCIETY'S SHOW.

9TH AND 10TH JULY, 1903.

FIRST DAY.

	Owner.	Name of Cow.	Lb. of Milk.	Per Cent. of Butter Fat.	Lb. Commercial Butter.
MORNING.	Mr. T. Summers... ...	Daisy	11	5·0	·61
	Mr. T. Summers... ...	Pettie	5	4·1	·23
	Mr. F. W. Jones ...	Madge	12½	3·9	·54
	Mr. C. C. Ridley ...	Queenie	12¾	4·4	·62
	Mr. C. C. Ridley ...	Lena	9¼	4·3	·44
	Mr. W. Fowler	Princess	10	5·0	·56
	Mr. W. Fowler	Lady	9¾	4·4	·48
	Mr. W. Fowler	Violet	8	4·7	·42
	Mr. W. Fowler	Pearl	8¼	4·1	·42
	Mr. W. Bates	Tricksy	9	4·4	·44
	Mr. W. Bates	Rocket	13¾	3·3	·50
EVENING.	Mr. T. Summers... ...	Daisy	7	4·6	·36
	Mr. T. Summers... ...	Pettie	4	3·2	·14
	Mr. F. W. Jones ...	Madge	8¼	3·5	·32
	Mr. C. C. Ridley ...	Queenie	9	4·9	·49
	Mr. C. C. Ridley ...	Lena	6¾	3·8	·28
	Mr. W. Fowler	Princess	7¼	5·1	·41
	Mr. W. Fowler	Lady	6½	4·6	·33
	Mr. W. Fowler	Violet	6¼	4·2	·29
	Mr. W. Fowler	Pearl	6½	4·1	·29
	Mr. W. Bates	Tricksy	7½	4·2	·35
	Mr. W. Bates	Rocket	10½	6·2	·72

	Daisy.	Pettie.	Madge.	Queenie.	Lena.	Princess.	Lady.	Violet.	Pearl.	Tricksy.	Rocket.
Morning	·61	·23	·54	·62	·44	·56	·48	·42	·42	·44	·50
Evening	·36	·14	·32	·49	·28	·41	·33	·29	·29	·35	·72
	·97	·37	·86	1·11	·72	·97	·81	·71	·71	·79	1·22

SECOND DAY.

	Owner.	Name of Cow.	Lb. of Milk.	Per Cent. of Butter Fat.	Lb. Commercial Butter.
MORNING.	Mr. T. Summers ...	Daisy	9¾	5·0	·54
	Mr. T. Summers ...	Pettie	5	3·4	·19
	Mr. F. W. Jones ...	Madge	12	3·6	·48
	Mr. C. C. Ridley ...	Queenie	12	3·9	·52
	Mr. C. C. Ridley ...	Lena	9½	3·8	·40
	Mr. W. Fowler	Princess	9¾	4·9	·53
	Mr. W. Fowler	Lady	9¼	4·3	·44
	Mr. W. Fowler	Violet	8¼	4·2	·38
	Mr. W. Fowler	Pearl	8¾	3·6	·35
	Mr. W. Bates	Tricksy	9¾	4·2	·45
	Mr. W. Bates	Rocket	12	4·3	·57
EVENING.	Mr. T. Summers ...	Daisy	6¾	4·6	·34
	Mr. T. Summers ...	Pettie	4½	3·4	·17
	Mr. F. W. Jones ...	Madge	8¾	3·6	·35
	Mr. C. C. Ridley ...	Queenie	8½	4·2	·39
	Mr. C. C. Ridley ...	Lena	6¼	4·2	·29
	Mr. W. Fowler	Princess	6¾	5·4	·40
	Mr. W. Fowler	Lady	6½	4·9	·35
	Mr. W. Fowler	Violet	5½	4·8	·29
	Mr. W. Fowler	Pearl	5¾	4·5	·28
	Mr. W. Bates	Tricksy	7	4·4	·34
	Mr. W. Bates	Rocket	9¼	4·4	·45

IN ORDER OF MERIT.

	Rocket.	Queenie.	Princess.	Daisy.	Madge.	Lady.	Tricksy.	Lena.	Violet.	Pearl.	Pettie.
First Day	1·22	1·11	·97	·97	·86	·81	·79	·72	·71	·71	·37
Second Day ...	1·02	·91	·93	·88	·83	·79	·79	·69	·67	·63	·36
	2·24	2·02	1·90	1·85	1·69	1·60	1·58	1·41	1·38	1·34	·73

RESULTS OF MILK TESTS AT WIDE BAY AND BURNETT PASTORAL AND AGRICULTURAL SOCIETY'S SHOW.

23RD AND 24TH OF JULY, 1903.

FIRST DAY.

	Owner.	Name of Cow.	Lb. of Milk.	Per Cent. of Butter Fat.	Lb. Commercial Butter.
MORNING.	Mr. W. Bates	Rocket	13¼	3·5	·52
	Mr. C. H. Hughes ...	Violet	15¼	4·6	·78
	Mr. J. Hockley	Darkie	16¼	4·0	·72
EVENING.	Mr. W. Bates	Rocket	13	4·0	·58
	Mr. C. H. Hughes ...	Violet	12½	4·5	·63
	Mr. J. Hockley	Darkie	13	5·4	·78

FIRST DAY TOTALS.

Rocket.	Violet.	Darkie.
·52	·78	·72
·58	·63	·78
1·10	1·41	1·50

SECOND DAY.

	Owner.	Name of Cow.	Lb. of Milk.	Per Cent. of Butter Fat.	Lb. Commercial Butter.
MORNING.	Mr. W. Bates	Rocket	14¼	3·6	·57
	Mr. C. H. Hughes ...	Violet	15	3·6	·60
	Mr. J. Hockley	Darkie	15½	5·2	·90
EVENING.	Mr. W. Bates	Rocket	11	4·0	·49
	Mr. C. H. Hughes ...	Violet	12	4·6	·61
	Mr. J. Hockley	Darkie	12½	6·0	·84

IN ORDER OF MERIT.

	Darkie.	Violet.	Rocket.
First Day	1·50	1·41	1·10
Second Day	1·74	1·21	1·06
Totals	3·24	2·62	2·16

HOW SUGAR-CANES ARE RAISED FROM SEED.

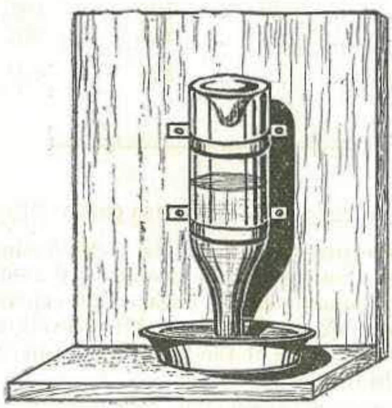
The following interesting account of the method adopted at Barbados for raising new sugar-canes from seed has been contributed by Mr. J. R. Bovell, F.L.S., F.C.S., superintendent of the sugar-cane experiments connected with the Imperial Department of Agriculture. Mr. Bovell occupies a unique position in this matter as he was one of the first to take up the work, and has been continuously engaged in it since 1889:—

In Barbados the panicles (arrows) are gathered as soon as the spikelets begin to be blown away by the wind, or as soon as a slight shake of the stem of the cane causes a few to fall. The panicles are then put into thin muslin bags and hung in a dry, airy place where a certain amount of sunshine is obtainable. At the end of a few days, when all the spikelets are readily detached, these are rubbed off and returned to the bags to dry for a couple of days longer. The seeds are then sown in well drained boxes of sifted garden soil, covered lightly with fine soil, watered, finally covered with sheets of glass, and put under cover, where they can receive only a limited amount of direct sunshine. Usually at the end of the fifth day a few of the plantlets will be up. At the end of the second week, nearly all of those likely to germinate will have grown. The seedlings are then somewhat hardened by gradual exposure to fuller sunshine. By the end of the second month they are fit for transplanting, they are then pricked off into small pots and placed under racks on which sacking is put during the hotter time of the day to protect them from the full blaze of the sun. By degrees this time is shortened, until they no longer need any shade. Three months from the time the seed is sown the plants are ready, and ought to be taken to the fields. But in Barbados, owing to the dry weather at this time of the year, it is necessary to let them remain in the pots till the rainy season sets in. The seedlings are now allowed to go on growing until the following December, when the most vigorous and largest clumps are regrown from cuttings in comparison with one of the standard canes. In the December of the second year of their growth the canes undergo a second selection, based on their vegetative characters, a portion of the plot being kept for chemical analysis in the following reaping season. From now onwards, the selection is based on the weight of the stems, and the saccharine richness of each cane.—*Agricultural News*, Barbados.

Poultry.

COOL WATER FOR FOWLS.

Some time ago we described and illustrated in this *Journal* a drinking fountain for fowls, by which a constant supply of fresh water is kept up. This consists of a zinc dome, with a square hole cut near the bottom edge. This dome is filled with water and set on a zinc trough. The water runs out of the hole at the bottom into the trough, and remains at a depth equal to the height of the hole from the bottom. As the fowls drink the water continues to run, and so keeps up a supply without overflowing. A still simpler contrivance is a common beer bottle. Make



a stand for it out of two pieces of wood—one horizontal, the other perpendicular. To the perpendicular piece attach two circles of wire to hold the bottle in position. Then put a soup plate or dish full of water on the horizontal board. Fill the bottle, cork it, then invert it over the dish. Take out the cork, taking care that the mouth of the bottle touches the surface of the water. There will be a supply kept up as long as there is water in the bottle. As the hot weather will soon be coming on, a device of this kind will prove a boon to thirsty fowls. It is also a safeguard against the drowning of little chickens.

PRACTICAL POULTRY-BREEDING, No. 2.

By W. HINDES.

Having procured a suitable breed, it is, first of all, necessary to give comfortable accommodation. The house need not be expensive, but should be free from draughts. Choose a north-eastern aspect, if possible, and leave the front open, so that the sun can shine in during the earlier part of the day; this will keep the house sweet. Ruberoid, used for the roof, the back, and the two ends, makes a splendid house; cover the front with wire netting. The house can be made of any size, according to the number of fowls: for fifty fowls, 10 x 12 feet at least will be required; for a small breeding pen, to hold six or eight birds, 4 x 6 feet will be sufficient. Too many fowls should not be kept in the one house—not more than fifty at the most, thirty would be better; for the larger number plenty of ventilation must be provided, a space of 4 inches left at the top will effect this, as it will allow the foul air to pass out without creating a draught. If the fowls are confined in small runs, it is best to have a scratching-shed beside the house; this will also act as a shade from the sun and shelter from the rain, saving the use of the roosting-shed, which should be kept sweet and clean for roosting purposes only. To get good layers, always breed your own pullets, having one or more breeding pens according to the number of fowls to be hatched. Breed a good number the first year; and when the pullets commence to lay, watch for the good layers; whenever a good layer is noticed, reserve her for future breeding. Never breed haphazard; it is a matter of like producing like, and a first-class layer can never be bred from a bad one; but by selecting the very best laying pullets year after year and mating them with males also bred from a good laying strain, it is possible to increase the laying qualities of any breed to an enormous extent. Another thing that should not be overlooked—never use late-hatched chickens to breed from; always breed from birds hatched not later than September, spring being the natural time for breeding. Moreover, early spring hatched birds generally moult early, and are, therefore, ready for breeding early chickens from in the second season, if wanted for that purpose. Another very important matter is that chickens hatched in September and August always make finer and larger birds than those hatched later; this is a great consideration. For breeding purposes, always use good-sized and well-developed hens or pullets; the size of the progeny will depend more on that of the hen than the cock, for, as a rule, we get size and shape from the hen and colour from the cock. As I stated at the commencement that laying is more a matter of strain than breed, I will give an illustration of my meaning:—One breeder selects his very best laying hens and pullets, and judiciously mates them with roosters from good laying strains year after year, always selecting the best. This breeder is all the time improving the laying qualities of his breed, and in a few years he has a really good laying strain of his own breeding. Another breeder will not go to the trouble of having a breeding pen and breeding his strain up by selection, but is content to let them all run together, perhaps purchasing a new rooster every second year, or even neglecting altogether to introduce new blood. Moreover, when he wants to hatch some chickens, he uses eggs at random laid by various hens, some of which do not lay more than two or three dozen eggs per year. He cannot, in consequence, expect to get good layers, and, if this system is carried on, he will certainly not advance much, but will very likely go back, as regards egg production. Now, we will say that both these breeders have White Leghorns: the first has, by careful breeding and selection, got his fowls to produce fifteen dozen eggs per hen each year, which is quite possible—this may be called a good laying strain. The other breeder's fowls, perhaps, produce only ten dozen eggs per year, and can only be called moderate layers. Both have the same breed, so for this reason I maintain that, whatever breed of fowls we keep for egg production, it is more a matter of strain than of breed.

COOKED CELERY FOR RHEUMATISM.

Science News says that celery is a cure for rheumatism. Indeed, it is asserted that the disease is impossible if the vegetable be cooked and freely eaten. The celery should be cut into pieces and boiled in water until soft, and the water drunk by the patient. Put new milk, with a little flour and nutmeg, into a saucepan with the boiled celery, serve it warm with pieces of toasts, eat it with potatoes, and the painful ailment will soon yield.

Such is the declaration of a physician who has again and again tried the experiment, and with uniform success. He adds that cold or damp never produces, but simply develops the disease of which acid blood is the primary and sustaining cause and that, while the blood is alkaline, there can be neither rheumatism nor gout.

The Orchard.

PINEAPPLE CULTURE.

By ALBERT H. BENSON, M.R.A.C.

PART IV.

MANURING.

Although pineapples, as I have already shown in a previous number of this *Journal*, are grown extensively in soils that are extremely deficient in all plant foods, it does not therefore follow that they will thrive without such plant food. In fact, the opposite is the case, as instanced by the poor sandy soils of Florida, U.S.A., already referred to, where artificial fertilisers costing from £10 to £20 per acre are applied, the soil itself being nearly a perfect matrix in which to grow the plant, provided it is judiciously fed. The question of manuring such soils is, therefore, an extremely important one, and has consequently received careful attention at the hands of Florida growers and of the United States Department of Agriculture at Washington. The result of the experience gained will be valuable to us; for, though we are not growing pines on as poor soils as they do in Florida, many of our older plantations require systematic manuring to keep up their fertility, particularly where other crops are grown in conjunction with the pines. We have also a large area of sandy loamy country close to the coast, in several parts of the State, which will grow excellent pines provided it is properly manured. The soil is somewhat similar to, only richer than, that of Florida; still not so rich that it will grow a number of consecutive crops without becoming seriously impoverished; hence manuring to keep up its fertility will be necessary. These latter soils, though not used to any great extent at present, are, in my opinion, some of the best pineapple soils in the State, as they are practically free from frost, and, when deeply worked prior to and systematically cultivated after planting, do not suffer from either excessive wet or dry spells, and are free from the so-called pineapple disease.

Where pineapples are planted in virgin land such as the free volcanic loams of our coastal scrubs or the deep sandy loams of heavy forest country, manuring is unnecessary, at any rate for several years after planting, the growth of both plant and fruit being so luxuriant that any increase of available plant food in the shape of manure would only tend to an overgrowth of plant, a coarseness of fruit, and loss of flavour; in fact, in the matter of flavour, the richest soils do not produce the highest-flavoured fruit. So far, I am sorry to say that in this State the question of determining in what proportion the essential plant foods should be present in the soil in an available condition, so as to produce both quality and quantity of fruit, has not been fully investigated; nor are the effects of particular plant foods on the growth of the plant or the size, flavour, and keeping qualities of the fruit clearly understood. A start was made in August, 1898, at Redland Bay. Several careful analyses of the soil were made as well as of the different manures that were applied. A large number of test experiments were carried out with both complete and incomplete fertilisers, but as they were not followed up I did not consider that they were worth publishing, as the results of one set of experiments are, as a rule, by no means reliable for reference purposes or for purposes of comparison. I am extremely sorry that the test experiments were not continued for several years, as had they been, I would now be in a position to speak authoritatively on the matter under local conditions, instead of having to go for my information to outside sources, as, no matter how good the latter may be, local conditions always play an important part in the results obtained.

When dealing with the question of manuring pineapples, the first thing to consider is, what plant foods are essential to its production.

These are lime, potash, phosphoric acid, and nitrogen, as the absence of any one of these plant foods in an available form will render the soil unsuitable for the production of pineapples till such deficiency be made good.

In a series of articles on manuring, written by me for this *Journal* in 1899 and 1900, I went pretty fully into the questions of individual plant foods and of the sources from which they are obtained, so I need not repeat what I then wrote, but will refer my readers to the articles mentioned. At the same time, in order to make this present article on pineapple culture as complete as possible, I will endeavour to give a brief epitome of my previous writings.

LIME.

Although this particular plant food is usually present in a sufficient quantity in most soils for the requirements of pineapples, still in some very sandy soils it is deficient, and a direct application for manurial purposes will have a very beneficial effect. It is not, however, so much for its value as a plant food that lime should be applied as for its chemical action on the soil, both by neutralising any excess of acid and by acting on insoluble potash and phosphatic salts and rendering them available for plant food. The mechanical effect of lime on the soil is also of great importance, as it renders sticky soils freer and easier to work, and thus enables the soil to be brought into a more perfect state of tilth. Not only this, but in the case of the fine red volcanic scrub or forest soils, all of which scour badly, the application of lime makes the soil easier to work and to scour better. By improving the mechanical condition of the soil the land becomes warmer—a very important consideration when we know what damage even a slight frost does to both the plant and fruit. And what a difference only one or two degrees in the temperature of the soil will make.

POTASH.

With the pineapple as with most fruits, potash may be said to be the dominant plant food, as it forms the greater portion of the ash of both the fruit and plant, and its absence in the soil renders such soil absolutely incapable of producing pines.

It should form a part of every manure that is applied to pines, as no commercial fertiliser would be complete for this crop unless it contained at least 6 per cent. of potash. Certain soils contain an ample supply of potash, often in an available form, such as rich volcanic scrub lands that have recently been burnt off, and on such the application of potash manures would usually be throwing money away; but most of our older plantations and also young ones on sandy soils will be benefited by the application of potash manures.

Where an abundant supply of cow and horse manure is available, it will not usually be necessary to add additional potash, as if these manures are well saved, so as to retain the liquid as well as the solid excrements, they will contain sufficient potash for the proper development of the plant and fruit. Where, however, farm manures are not available, then potash must be applied in the form of a commercial fertiliser. Potash may be obtained locally in the following forms, viz.:—

Kainit, which contains about 12½ per cent. of potash. Though comparatively cheap per ton, the small amount of potash it contains makes it the dearest source of potash on the market, and where it has to be taken any distance the carriage and cartage of the extra bulk are also considerable items to be taken into consideration.

Australian Potash.—A low-grade potash, containing about 17 per cent. of potash in conjunction with a little phosphate, magnesia, and sulphate of lime. This is probably the cheapest source of potash on the Australian market. It is somewhat similar in composition to what is known in America as low-grade sulphate of potash or double potash salts, being a sulphate of potash and magnesia, in which the potash varies from 22 per cent. to 26 per cent. This is largely used by pineapple-growers in Florida, and is in many cases preferred to the high-grade sulphate and muriate of potash, so that *Australian Potash* should be worth trying here, especially on sandy country.

Sulphate of Potash.—A good sample should be of 97 per cent. purity, and contain about 52 per cent. of pure potash. It is a high-grade potash manure, and, where carriage is an item, is the cheapest form of potash. It gives good results on land deficient in potash, and is largely used in Florida.

Muriate of Potash.—Like the high-grade sulphate, this salt should be of 97 per cent. purity, and should contain 61 per cent. of pure potash. As a general rule, its manurial value is not considered as high as that of high-grade sulphate, though it contains a larger amount of pure potash. It is considered by some that pines grown on land fertilised by it are tender and bleed easily (Rolfs). If this is so, it is better to stick to the sulphate, as firmness of fruit is very important both for canning and shipment of fruit.

A complete series of manurial experiments carried out by Professor P. H. Rolfs, of the United States Department of Agriculture, on a pineapple plantation near Jensen, in Florida, gave the following results with various potash manures:—

The soil on which the experiments were conducted showed by chemical analysis that all the essential elements of fertility were wanting; hence the results of the application of the different potash manures should give very reliable returns.

"Potassium-magnesium carbonate gave the best returns; low-grade sulphate of potash stands second in the list. High-grade sulphate of potash stands slightly below low-grade sulphate of potash. Muriate of potash stands fourth in the list."

This is very valuable information, as it shows us that our Australian potash, which contains 17 per cent. pure potash, 5 per cent. phosphoric acid, together with magnesia and sulphate of lime, is probably one of the best and cheapest forms of potash we can apply to our pines.

PHOSPHORIC ACID.

According to Rolfs, the quantity of phosphoric acid required by the pineapple plant for its fruit is only one-tenth that of potash, so that few of our soils, except the very poorest or those that have been seriously depleted of this plant food by cropping, require special phosphatic manures. Where farm manure is available they certainly do not require any extra phosphoric acid other than that contained in such manure; but where the land is very poor or worn out and such manure is not available then it will be necessary to apply this particular plant food to the soil.

Phosphoric acid may be applied to the soil in two forms, viz.:—Insoluble or bone phosphate and soluble or superphosphate. The former is readily obtained in the refuse bones of our meatworks, mineral phosphates, Thomas's phosphate, and other sources; and the latter by treating any one of these insoluble forms with sulphuric acid. Referring again to the Florida experiments, we find that "A small amount of soluble phosphoric acid will suffice. Superphosphate is decidedly an unprofitable fertiliser. Bonemeal has shown itself a very efficient substance."

I cannot say that in the experiments conducted at Redland Bay, superphosphate was found unsatisfactory, as from the limited experience we had it certainly proved otherwise; at the same time, as bonemeal has shown itself to be preferable in Florida, not only in the experiments carried out by Mr. Rolfs, but also in the opinion of the majority of the growers, it is certainly wise to act on the experience gained there; especially as superphosphate is liable to be washed out of the soil by heavy rain, whereas insoluble phosphates are not so liable. Again, the insoluble phosphate is a much cheaper form in which to apply the phosphoric acid in this state, as it is the dominant plant food in all meatworks manures, bonemeal, bonedust, &c., all of which are readily obtained in most parts of the State at reasonable rates.

NITROGEN.

Although this plant food is not required in large quantities for the growth of pineapples—1,000 lb. weight of fruit only containing one-fifth of a pound of nitrogen, according to an analysis of the fruit given in the Year Book of the United States Department of Agriculture for 1894—it is very essential to the proper development of the plant and fruit, and any deficiency in the soil is soon shown in the health and vigour of the plants. Although not required in large quantities, an abundant supply in the soil soon shows itself in the robust growth of the plant and in the size of the fruit. This fact is well known to all growers, as soil rich in decomposed vegetable matter, which contains the available nitrogen, unless absolutely deficient in other plant foods, is noted for the strong growth pines make in such soil, and for their dark healthy appearance.

Soils deficient in nitrogen must be manured with farmyard manure, or failing that, with one or other of the commercial fertilisers containing this plant food.

There are several sources of nitrogen available in this State, of which the following are the chief:—

Dried Blood.—A good sample should contain at least 13 per cent. of nitrogen, which is not readily available. This is a point in its favour, as it is more lasting and not so liable to be washed out of the soil by heavy rains.

Meatworks Manures, or Blood and Bone Manures.—These vary somewhat in the amount of nitrogen they contain, which ranges from 6 to 9 per cent., the proportion of blood present accounting for the comparatively wide range. The nitrogen here is combined with insoluble phosphates, and is slow acting. This is one of the best forms in which it can be applied, particularly when the soil is deficient in phosphoric acid as well.

Nitrate of Soda.—A good sample should contain nearly 16 per cent. of nitrogen. It is a very quick acting manure, and is, therefore, not so suitable for pines as the manures already noted. At its present price it is also an extremely dear source of nitrogen.

Sulphate of Ammonia.—A good sample contains 20½ per cent. of nitrogen. Like nitrate of soda it is very soluble, and consequently acts quickly. It has a remarkable effect on pines that are a bit off colour, but for general use it is not as reliable a source of nitrogen as the slower acting manures mentioned.

Having now shown the various plant foods that are required for the proper development of pineapples, and the sources from which the manures may be most properly obtained, I will briefly recapitulate the results of the Florida experiments already referred to:—

1*st*. *Potash.*—A low-grade potash, such as Australian potash, gave best results.

2*nd*. *Phosphoric Acid.*—Insoluble phosphates are preferable to superphosphates. Bonemeal is the best form.

3*rd*. *Nitrogen.*—Slowly acting nitrates, such as dried blood or blood and bone manure, are preferable to quick acting, readily soluble, highly nitrogenous manures such as nitrate of soda or sulphate of ammonia.

In other words, the result of the American experiments shows that pineapples do not require too concentrated or too quick acting manures, but rather manures that yield their plant food gradually, as the requirements of the plant call for them. This, I may say, bears out the experience of Queensland pineapple growers to a large extent, as many years' practice has shown us that, given a good supply of reliable farm manure (cattle, horses, pigs, &c.), which is a simple and lasting manure, no artificial fertilisers are required.

A good supply of farm manure is now, however, difficult to procure, as many of the sources of supply from which the growers in the Brisbane district used to obtain it have ceased to exist, and recourse has to be made to commercial fertilisers to keep up the fertility of the plantations. The question therefore arises as to what is the best complete commercial fertiliser to use; and although this is an impossible question to answer for all kinds of soils, the experience gained locally, backed up by that gained in Florida, tends to show that a slowly acting manure of comparatively low grade is to be preferred. Such a manure should be a complete fertiliser, viz., should contain all the essential elements of plant food required for the production of the pineapple plant and fruit; and the following mixtures will be found to answer these requirements :—

A.—A mixture of 10 cwt. of bone and blood manure or meatworks manure, and 10 cwt. of Australian potash. Taking the average analyses of those manures as published by the New South Wales Department of Agriculture in the *Agricultural Gazette* for April, 1903, this will give us a manure containing practically—

12 per cent. of insoluble phosphoric acid.
4 per cent. of nitrogen.
8½ per cent. of potash.

B.—A mixture of 8 cwt. of dried blood and 12 cwt. of Australian potash. This will give a manure containing about—

6 per cent. of insoluble phosphoric acid.
5 per cent. of nitrogen.
10 per cent. of potash.

If desired, sulphate of potash can be used instead of the Australian potash, using 1 cwt. of the former in place of 3 cwt. of the latter, and this will give about the same proportions of the various plant foods.

These figures are only approximate, as the analysis of both blood and bone manures and meatworks manures vary considerably in the proportions of nitrogen and prosphoric acid that they contain, and the analysis of Australian potash, as given by the vendors, is considerably higher than that of N.S.W. Department. At the same time, they may be taken as a fair average of the manures mentioned.

The quantity of A or B to be applied per acre will vary from 5 to 10 cwt. according to the age of the plantation and quality of the land. Probably the best time to apply these manures will be during winter or early spring. Where the land is planted in the check or American system, the manure should be scattered through the rows and worked in with a Dutch hoe; but where planting in the single or double row is in vogue, as is the common practice here, they should be dug, chipped, or ploughed in as near the rows as possible, without injuring the roots to any serious extent. In sandy soils the total quantity to be applied should be given at two or more dressings, so as to prevent any possible loss by leaching, but on good loamy soil this will not be so necessary.

I now come to the question of manuring with farm manures—the system that has given the best results in the past; and will endeavour to show how the supply of this material can be increased by every grower. As already stated, farm manures, which consist of the solid and liquid excreta of our domestic animals mixed with bedding consisting of straw, dried grass, weeds, or often sawdust in the case of town stables, are complete fertilisers, containing all the elements of plant food; but, as distinct from commercial fertilisers, the food, instead of being in a more or less concentrated form, is diffused through a large bulk. This has its advantages when it is produced at or near the land to which it has to be applied, but is a great drawback when it has to be carted some distance, as the cost then is often greater than its manurial value.

The great advantage of farm manure is that it contains, in addition to the requisite plant foods in an available condition, a large quantity of decaying vegetable matter, which tends to keep up the percentage of humus or organic matter in the soil, thus rendering it light and friable, as well as enabling it to retain more moisture for the plants use during dry weather. Farm manures also perform another very important function in that, by their means, the micro-organisms that have the power of converting the nitrogen in the soil or manure into an available plant food are introduced into the soil, or, in other words, farm manures play a very important part in what is termed nitrification.

The question of conserving and utilising to the best advantage all the farm manure that is produced by the stock belonging to pineapple-growers, though one of considerable importance, is often given much less consideration than it deserves. Practically every grower keeps one or more horses, besides a cow or two, pigs, poultry, &c., the manure from which, if carefully conserved, would be a valuable asset. As a rule it is either neglected altogether, or is so badly handled that the greater portion of its manurial value is lost. Now, farm manure will pay to take care of, especially for pineapples, and the supply can be easily increased. Instead of letting the cows and horses roam at large at night, they should be kept in—the horses either in a stable or shed, with yard attached, and the cows in a shedded yard. It will pay to keep the stock in and feed them rather than let them roam at large, as if the yard is kept bedded, so as to retain both the liquid and solid excrements, it will astonish most persons to see what a large heap of valuable farm manure will soon accumulate. Anything will do for the bedding, such as weeds and other refuse that is usually burnt, as all that the bedding is for is to absorb all the manure and let none be lost. There must be no leaching out of the manure, for if black liquor is seen flowing away from the yard the bulk of the manurial value is being lost. Unless the yards are covered in, which is not advisable in this climate, a shelter-shed being sufficient, there is bound to be some loss during heavy rains, but this can be got over to a certain extent by having the floor of the yard well tamped, so that the liquids do not run away, and by using sufficient bedding to absorb the excess of moisture. As already mentioned, a bulky low-grade manure, such as would be made under the conditions I have mentioned, is exactly what we require for pineapples, and should it be low in plant food it is easy to add a quantity of commercial fertilisers, such as already recommended, to the bulk, so as to bring up the quality of the whole. Farm manure should be applied to the pines whenever available, as, unless carefully turned and well made, it is apt to deteriorate by keeping. It can be dug or forked in on either side of the rows, or in the case of old plantations it can be applied by what is known as centre manuring, which consists of cutting back all the tops of the plants and giving a heavy surface dressing right through the whole of the bed. Personally, I am not in favour of this method, as it necessitates the severe cutting back of the plants, and not only that; it tends to keep the plants too long in the ground—a fault that in my opinion all the older pineapple-growers make, as when it is time to centre manure it is time to replant the plantation.

I am satisfied that we keep the pineapple plants too long in the same ground without replanting, as it is well known that young plantations are most vigorous and produce the largest fruit. This matter was, however, dealt with by me in Part III. of this article, so that I need not refer to it further.

Whilst speaking of the importance of conserving farm manure, I think that the following figures, which I have worked out from the tables given of the value and amounts of manures produced by various farm animals, as given by J. P. Roberts, Director of the College of Agriculture and Professor of Agriculture in the Cornell University, U.S.A., will be of considerable interest.

The average annual total amount of the excreta of a horse is 20,000 lb. of which 12,000 lb. are solids and 8,000 lb. liquids; and of a cow, 28,000 lb., of which 20,000 lb. are solids and 8,000 lb. liquids.

The average value of the former is about 11s. per ton, and of the latter about 10s. per ton, estimated at the present unit values of nitrogen, phosphoric acid, and potash. If the whole of the excreta could be saved, this would mean that its value in the case of a horse would be £4 18s. per annum and of a cow £6 5s. per annum, but as this is not possible it may be computed that three-fifths of the amount can be saved by keeping the animals in at night, or a net value of nearly £3 saved in the case of a horse and of £3 15s. in that of a cow. The figures given are an average of many experiments and of various food rations. When well fed, the value will be rather higher; but where little if any extra feeding, especially in the case of the cow, is given, the manure value would be considerably less.

The value of the manure is influenced not only by the quality of the excrements, but also by the bedding used; thus, where sawdust is used, as is commonly the case with livery stable and 'bus horses, the value of the manure is reduced, but where good straw bedding is used it is increased.

In addition to conserving all the farm manure possible, the use of compost heaps, as recommended by me from time to time in this *Journal* is an excellent way of obtaining manure for pineapples, as compost manures are bulky, and if commercial fertilisers are added to them they can be made of any desired degree of richness to suit any particular land.

Before concluding these remarks on manuring, there is one point I see I have not mentioned, and that is the manuring of the land prior to planting. In some land this is seldom necessary, unless it is of very poor quality, but on old land that has previously been under pineapples or other crop or crops it is a good plan, if cattle are available, to camp them on the land at night, and if possible feed them well while so camped, as the manure they will leave will have a very beneficial effect. Another good plan is to plant the ground with a leguminous crop, such as cowpeas, velvet beans, &c., that has been well manured with a commercial fertiliser rich in phosphoric acid and potash, and preferably to feed off this crop on the land, with hogs or cattle, or failing this to let it rot down and then plough in. By doing this the land will be rested, well manured, and brought into a state admirably suited to the growth of the pines to be planted on it.

THINNING PEACHES.

Peach-trees are now in fruit, and the question of "To thin or Not to thin" will arise. It is an undoubted fact that thinning the young fruit greatly improves the quality and size. Now if a fruit-grower can improve the quality, size, and colour of his fruit, whatever it may be, by thinning it out when young, he realises by future sales far more on the lesser number of superior fruit than he would on the larger quantity of inferior fruit. He has less labour in picking, less to pack, less to haul and pay freight on, but he has a larger profit to make than if he allowed Nature to have her way with the crop. As to when peaches should be thinned, it should be done when the fruit is of the size of a marble. Some say, "When the fruit is as large as the stone will be in the ripe fruit," which is the same thing in other words. In all operations with fruit and fruit trees note must be taken of the season, whether wet or dry, also of the tree, whether it is in good, healthy, or poor condition. The former can carry a great deal more fruit than the latter, for the reason that the healthy tree has probably had given to it or has discovered some good fertiliser which will help it to bear a heavy crop. In a wet season, too, more fruit may be allowed to remain than in a dry one. It is a good practice to leave a distance of 6 or 7 inches between each fruit.

DISEASE IN CABBAGE.

A correspondent writing to the Jamaica Agricultural Society on the disease of cabbage, states:—"The so-called disease is caused by people using new stable manure and horse dung; the cabbage tribe cannot stand the above manure under a year old, and it should be stored in a shed and turned over now and then. Publish this and after a time you will cease to hear about cabbage disease."

Horticulture.

SEEDS WHICH SHOULD NOT BE SOWN FRESH.

The following article on the above subject, by Jules Rudolph, translated from the *Revue Horticole*, we take from an exchange. The statements concerning old seed have been confirmed in this State, especially in the case of cucumbers, cabbages, melons, &c. We have clearly proved it ourselves with broad beans. Nearly three years ago we sowed a plot of beans, and had a fair crop. The balance of the beans was put away and forgotten until last April. Then they were sown, and the result has been a splendid crop of beans, the haulms measuring between 3 and 4 feet in height.

In a book published anonymously in the year 1765, I find the following passage about stocks :—

"Many amateurs and professional gardeners are certain that Stock (Giroflée) seed kept for five (5) or more years give a larger percentage of doubles than fresher seed. Taking for granted that this is really a fact, the reason is that the seeds which can only produce single Stocks decay, losing their germinating power sooner than the others. So old seed will, in fact, produce fewer plants, but of the plants produced there will be a greater percentage of doubles."

How far can we now believe this statement, made as long ago as 1765? According to traditional belief, it is better to use for some vegetables and flowers seeds from two to five years old. Why? Old gardeners say that new seeds produce plants less shapely, running more quickly to seed, and of such vigour that they do not preserve all their true characteristics, while seeds two or three years old give more shapely plants, with less tendency to run to seed. I believe in this, and will try, if possible to explain it.

All plants, or, I should say, most of them, have the power of reproducing themselves from seed, with their own characteristics, but at the same time they are influenced by atavism, which tries to make them revert to the specific types from which they came. Thus in the seed of some varieties two forces struggle, the one tending to make them revert to the primitive type, the other tending to reproduce certain acquired characters more or less fixed by selection. It is possible that this atavistic force weakens with the age of the seed, as also that abnormal vigour which makes certain plants run to seed if grown from seeds too fresh when sown. This is not the case with stocks. If we admit that double flowering of these plants is a weakness of degeneration, it is easily believed that seeds some years old no longer possess their pristine vigour, and can produce a double flower instead of a single. We have here a real transformation of the seed, a transformation which can be allowed if we remember that the less stocks are let run wild the more chance one has of obtaining double flowers. It is for this reason that stocks are grown in pots in Germany. In this way a much larger percentage of double flowers is obtained than in the case of plants grown in the open. Many growers prefer to use China Aster seed one or two years old, saying that by so doing they get more double flowers. But, above all, it is in the kitchen garden that it is necessary to know whether to choose young or old seed according to the species or variety. Thus, for beetroot and carrots, seed two years old should be used to let the root form better and keep the plants from running; for chicory and cabbages three-year-old seed, as then the plants shoot and ripen better. If we do not wish to let spinach, lettuce, or raddish run to seed, or differ from the type, we must use two-year-old seed. For corn salad it is necessary to use seed at least a year old, as seed gathered in June will scarcely grow if sown in the following September or October.

In the *Good Gardener* for 1829 gardeners are recommended to sow melon seed several years old, the same rule applying to the other Cucurbitaceæ.

For early sowings of turnips it is necessary to use seed several years old to prevent the plants running to seed. The influence of time on the germinating value of seeds appears then to be a well-established fact, and, perhaps, it is hardly possible to account for this influence otherwise than by the theories I have put forward.

EARLY FRUITING PERSIMMONS.

In our July issue the name of Mr. C. A. Flay's new persimmon is given as "Yane Nashi." It should have been written Tane Nashi.

A NEW RUBBER.

The plant, *Landolphia thralloni*, has been discovered in the French Congo. It produces valuable rubber, which is selling at 3s. per lb. It is claimed that the new discovery will revolutionise the rubber industry. Of this new rubber:—Mr. J. C. Willis, of Ceylon, though he confesses ignorance of this particular plant, has observed that the *Landolphia* is a well-known genus of rubber, of which there are many species found in tropical Africa. New rubber plants were, he said to a representative of the *Times of Ceylon*, constantly being brought to light, and "of course if you found them in your jungle they would be worth attending to. I don't think 3s. per lb. is anything out of the way for African rubber," he said. "To the best of my knowledge African rubber is generally worth at present from 3s. to 3s 6d. per lb., and 4s. 3d. has recently been paid for the best Para; so that it doesn't strike me that this new plant is anything unusually good.

"Of course any new find in Africa is sure to be made the most of, because everybody is looking for rubber now and, owing to the extremely wasteful manner in which rubber trees are tapped where native labour is employed, new trees are constantly having to be found, and the old trees are given up. Those interested in rubber have to go further inland to find their rubber. In order to prevent this, to some extent, I think in the British West African Colonies, the Government does not allow the trees to be thus wastefully dealt with, and they have something like a Forest Department to protect the industry. Naturally if you leave it to a private company to come in, you may be pretty certain that the company will take all the rubber it can get away, and that means that the trees will be more or less killed, unless the company has sense enough to see that it pays to tap gently."

Mr. Willis instanced, as a result of this ruthless tapping, the fact that those in search of rubber on the Amazon have to go an immense distance up the river and then far inland before they can find the rubber-trees; all this means heavy freight charges, and consequently the industry does not in the end pay so well as it might do. He also pointed out the significant fact that rubber cost more in Para than rubber grown in Ceylon did when sold on the London market.

"Turning again to the *Landolphia* species, it occurs all over tropical Africa, as above-mentioned. It is found in German East Africa, British West Africa, and in many parts of the Soudan. Mr. Broun, our late Conservator of Forests and now Director of Forests in the Soudan, has been finding the *Landolphia* genus of rubber over a good part of the Soudan forests—that is, of course, the Egyptian Soudan. The French Congo touches this district, and there is reason," said Mr. Willis, "why there should not be *Landolphia* in the French Congo."

In conclusion he said: "But the new variety can only revolutionise the industry if it is found in such enormous quantities as to swamp the market and reduce prices all round. Then it would be very serious. Otherwise it is nothing to be alarmed at. Three shillings is a good price, but it is not the top price. The best Para is 3s. 8d. per lb."—*Planter's Opinion*.

Tropical Industries.

THE PREPARATION OF MARKETABLE RUBBER.

The *Ceylon Tropical Agriculturist* publishes several reports on the rubber industry in the Federated Malay States, from which we extract the following:—

Coagulation of the latex should be effected immediately after it has been collected, for if allowed to stand even until the following morning decomposition of the proteid matter will often set in, and the value of the rubber will be decreased. This is easily detected by the putrid smell which is given off by the latex, or in the case of prepared rubber by the dark-coloured blotches, both of which can be entirely avoided by coagulating the latex immediately it is brought in from the trees. The rubber will then have only a slight, unobjectionable, characteristic odour, and will be of a light amber colour, deepening slightly with age.

The composition of the latex of Hevea, as given by Seeligmann,* is as follows:—

Caoutchouc ...	32 per cent.	in solution.
Nitrogenous matter (proteid)	2.3	
Salts	9.7	
Resinous matter ...	traces.	
Water, slightly alkaline	55.6 per cent.	

The quality of "Para" rubber is due to some extent to the very small proportion of resinous matter contained in the latex. The latex, however, differs perceptibly in the percentage of caoutchouc it contains, sometimes being of a creamy consistency with a yellowish tinge, while that from other trees has a more watery appearance and resembles skimmed milk; but, as the latex from the various trees is not coagulated separately, this difference in the quality of the latex does not necessarily result in rubber of different grades. The Brazilian method of coagulating the latex by smoking it has been described many times, and need not be repeated here. Rubber prepared by this method still commands the highest price of all native-cured rubbers in the market, but whether the "Para" rubber so prepared will continue to occupy the premier position when pitted against rubber coagulated on more scientific principles is very doubtful. There will probably be a certain amount of conservatism to break down, as is generally the case when a new product makes its appearance on the market, but we may rest assured that, so long as rubber continues to be used for the manifold purposes it is at present, it will always command a remunerative figure; and when prepared free from all foreign matter, and shipped in as dry a condition as possible, the probabilities are that it will eventually oust the "Para" rubber of to-day from its present position, for purity and freedom from moisture are what the manufacturer most desires.

The preparation of the commercial article is quite a simple matter, and the cost but slight. The method I have adopted is as follows:—Before tapping, a little water, about sufficient to cover the bottom of the tin, was placed in each tin, in order to delay coagulation until the tins could be collected, which is generally about an hour after the incision has been made. As soon as the flow of latex has ceased the tins are collected, and the contents poured into a basin and an equal amount of water added. In this dilute state the latex was strained through a fine muslin cloth, and practically all dirt, bits of bark, &c., were thereby removed; the latex is now ready to be treated with some coagulating re-agent, such as acetic, nitric, or sulphuric acid, corrosive sublimate, alum, or other salts. All these substances and many others have the effect of collecting

* Seeligmann, Le Caoutchoc et la Gutta Percha.

the rubber particles, which are suspended in a watery fluid, into a solid mass, which can then be pressed and dried.

The coagulating power of the various acids differs considerably, but in all cases a very small amount is required. Parkins gives the following approximate figures (*loc. cit.*):—

100 c. c. of pure latex are completed, coagulated by				0.1	gram	sulphuric acid
100 c. c.	,,	,,	,,	0.1	,,	hydrochloric acid
100 c. c.	,,	,,	,,	0.3	,,	nitric acid
100 c. c.	,,	,,	,,	0.95	,,	acetic acid.

He also states that "if excess be added, then coagulation ceases to be complete." This I have found to be the case with many of the acids I have employed, though not so with acetic acid, even when ten times the requisite amount has been added, in which case coagulation took place instantly, so that it was impossible to pour the latex out into flat dishes. The residue, however, was quite clear, showing that all rubber had been extracted. The great thing to remember is that the quantity of acid required depends upon the volume of *pure latex*, and no matter to what extent it is diluted the amount of acid required to bring about complete coagulation remains the same.

In actual practice, I have found that acetic acid is by far the handiest to work with, as the range being so considerable the quantity required to bring about complete coagulation is easily determined without going to the trouble of ascertaining the volume of pure latex to be coagulated.

When the latex had been strained, as described above, a small quantity—roughly about a teaspoonful to a pint of latex—of acid (acetic) was added, and the whole stirred for a few seconds. If there were no signs of coagulation a few more drops of acid were added and stirred again, when usually it would gradually assume the consistency of thick cream, when it was immediately poured out into enamelled plates. The stirring and pouring out of the latex should be done as gently as possible, so as to avoid the creation of bubbles, which burst when the rubber is submitted to pressure, giving a roughened appearance to the surface. Enamelled plates are recommended in preference to tins, as the latter are liable to become rusty, and are also acted upon by the various acids.

After a lapse of three or four hours coagulation should be sufficiently complete to allow of the rubber, now in the form of a thin solid cake, and of a pure white colour, being taken out of the dishes and submitted to pressure, so as to express as much of the moisture as possible. Any kind of pressure may be employed, but something after the style of the old-fashioned English wringing machine will probably be found as effective and inexpensive as anything that can be devised.

The advantage of adulterating the latex and then coagulating by some re-agent may not at first sight seem quite apparent, but unless some such principle be adopted it will only be found possible to prepare a small percentage in the form of thin sheets, by far the greater amount coagulating in the tins before they are removed from the trees. Such rubber will be in the form of irregular lumps, will be difficult to dry, and will contain a certain amount of impurity no matter how carefully the tapping be conducted. Moreover, unless some means of assisting coagulation be resorted to, difficulties are often experienced in wet or cloudy weather, decomposition setting in, resulting in a discolouration of the rubber, an evil odour, and consequently a depreciated value.

In bright weather, rubber prepared by the addition of acid can be dried in about a week or ten days, if placed on a rattan bench, where there is a free circulation of air—assuming the cakes are not more than one-eighth of an inch in thickness; but on no account should it be placed in the sun, or the surface will be rendered permanently sticky. The producer, however, should render himself independent of atmospherical condition, by erecting a special house for this purpose. Something in the nature of a tea-withering house would suit admirably; or on those estates where rubber is supplanting coffee, a new use for the coffee-drier may be found. Unless some such arrangement already exists on the estate there is no necessity to go to any great expense in this direction; all that is required is a high temperature easily regulated, and a strong current of air with the object of driving out all the moisture as quickly as possible, thereby enabling the producer to realise on his rubber with the least possible delay.

Moulds are very troublesome, and in damp weather will sometimes appear in the course of forty-eight hours, but their growth would be hindered to a great extent, and probably entirely prevented, if the rubber was kept in a drier, with a strong current of dry air passing through, until ready for shipping.

As compared with other tropical products, it will be seen that the preparation of commercial india-rubber presents very few difficulties, while the cost is comparatively small. Samples of rubber prepared by various methods are being sent home for valuation, and the result, with other remarks touching on this question, will form the subject of a further report.

RUBBER-TAPPING EXPERIMENTS AT THE BOTANIC GARDENS, SINGAPORE.

Mons. Bounechaux, a man of great experience in the rubber business of Brazil, where he had spent some time among the Seringuiros, on the Amazon, investigating their methods and collecting notes and observations on all subjects connected with Para rubber, paid a visit last February to Singapore. The Agricultural Bulletin of the Straits gives a very interesting account of his visit and its results:—

Having seen attempts made to cultivate rubber in Africa and Madagascar, he was by no means prepared to see the rubber plantation in the Botanic Gardens, which astonished him. He stated that the damp low-lying ground and the soil in which the trees were growing were exactly similar to that of the best Amazons districts, and that the trees in every way resembled those found there, both in kind, appearance, and development for age. The herring-bone method of tapping which we had been adopting, and which has been often described, he did not approve of, and declared that trees so cut would in the Amazons be speedily destroyed by insects attacking the exposed wood. At his suggestion, and with his aid, we tapped 150 trees in the Amazon method. This has often been described and figured, and is briefly this: The collector cuts a single cut on each tree as high as he can reach with a small axe, the edge of which is an inch or an inch and a-half long. Next day he cuts again four fingers' breadth below and so on to the base of the tree, making one cut a day for every 4 inches of diameter of the tree, so that a tree 12 inches through would have three cuts a day. Small tins tapering to the bottom are pushed into the bark by their sharp edges below the sloping cut, so that the latex is caught in them. The first day the latex is watery and scanty, and is generally neglected, but it increases in quantity each day, though it often does not flow really well for six or eight days. The preliminary cuts are made with a view of "calling the latex." It has often been shown that in the herring-bone method the flow of latex gradually increases as the wounds are again and again reopened, the greatest flow usually occurring on the eighth day, and this phenomenon is doubtless due to the same cause as produces the increased flow in the latex cuts made in the Amazons method.

At M. Bonnechaux's suggestion an iron axe (not steel) of the exact pattern used by the Seringuiros of the Amazons was made by a Chinaman in a few hours, at a cost of 25 cents, and, failing anything else, small conical tins used for cake-moulds were used to catch the latex. These were not altogether satisfactory, as they were too large and too broad at the bottom, allowing the latex to coagulate too quickly. They were also not strong enough to be easily fixed by pushing the edge into the bark below the cut. However, they did pretty well till more suitable ones could be made. The tapping takes place in the early morning as soon as daylight appears, and the milk is collected when a sufficient number of trees have been done, 150 to 250 in a morning, the collector stopping about 10 or 11 o'clock, and, going round again, pours the milk into a specially made can, and takes it to the fire to be smoked. The trees are tapped thus for 180 days continuously, and then allowed to rest for six months, and seem so little the worse that M. Bonnechaux declares he knows of trees which have been tapped thus for eighty years.

The wounds seem to close up with surprising rapidity, especially if the latex remaining in them is not removed, so that the risk of injury to the tree from fungi or insect attacks is very slight.

It might be thought that the amount procured from each tree would be very small, and the work would be slow and so expensive, but it really does not entail so much labour as would appear, as the cut and fixing the cup done by two men experienced in the work takes a very short time.

We found that the latex here coagulates more quickly than it does in the Amazons, probably on account of the greater heat during our late experiments, and to prevent this the man who fixes the cup puts a few drops of water in the bottom, which prevents its coagulating at once. The addition of water does not give much trouble in recovering the rubber, even if by accident, as during a heavy rainstorm, the cups are filled. This occurred on one afternoon when during the tapping a violent shower diluted the milk to overflowing. The milk was strained and acidified by acetic acid, and, though the water was in excessive proportion, on restraining the liquid it was found quite easy to recover the whole of the rubber.

One attempt was made to prepare the rubber by smoking it in the Brazilian method, but as the apparatus was not satisfactory the result was not successful. In the later experiments the rubber was coagulated in enamelled plates with acetic acid, a process described as turning out samples highly valued by experts.

After M. Bonnechaux left, Mr. Machado continued experiments on 100 trees, tapping them each day, using sometimes the little axe, at others a chisel and mallet. The former is undoubtedly the quicker instrument, but is apt to start the bark on either side of the cut; whether this will prove injurious to the tree or not remains to be seen. At the same time, the axe makes a wound of the same size and shape each time, and, by getting an axe made of suitable size and with a cutting edge of the right form, a coolie can make fewer blunders in cutting, while with the mallet and chisel he is very apt to cut out too large a piece of bark, and so make a wound which takes longer to heal.

It was observed that when the tree was beaten with the mallet in the vicinity of the cut, but not hard enough to bruise the bark, the flow of latex appeared distinctly to increase.

On 4th March, Mr. Machado commenced experimental tapping on 100 trees in a triangular plot of ground near the entrance of the Economic Gardens. The circumference of all the trees at 4 feet from the ground was 281 feet 7 inches. Average circumference per tree, 2 feet 10 inches. The largest tree was 5 feet 1 inch in circumference, the smallest 1 foot 3 inches. The oldest trees here are about fifteen years old, but many are seedlings of later date. At least 25 were under 2 feet in circumference and obviously young plants of six or eight years. The trees are not quite 10 feet apart. The soil is damp and low-lying, and occasionally flooded.

The trees were tapped at 6 o'clock in the mornings every day, except Sunday and one other day, and twice when the tapping was done in the afternoon. For the first five days each tree received one tap—*i.e.*, a single cut—on the next four 2 each, and on two days 20 trees received 10 cuts each. In the table appended it will be noticed that it took two days to call the latex, only a very little being produced then. Thence there was a tolerably steady increase. On the 13th, 100 trees were tapped with two incisions in the morning and afternoon, giving 17 oz. altogether. The sudden increase from the 13th onwards was undoubtedly due to the rainfall which commenced at that time. It will be noticed that 40 trees with 5 incisions each give as much latex as 20 with 10 incisions and 100 with 2, which shows that each cut gives approximately the same amount, and the return depends more on the amount of incisions than on the size of the tree.

It was noticed that a tree which at one time produced but little rubber, after being cut ten days in succession, suddenly became very productive. It is probable that some trees which may contain a very fair amount of latex require a larger period of "calling" than others.

Another curious phenomenon was that after the hot and dry season, when the rains commenced, the old wounds, which had long ceased to flow, suddenly after a violent shower broke out again and produced long tears of rubber:—

Date.	Number of Trees Tapped.	Number of Incisions to each Tree.	Dry Rubber Produced.	Scrap Produced.	Total for the Day.	Remarks.
			Oz.	Oz.	Oz.	
March 4	100	1	...	1¼	1¼	Scrap from a bough riddled by beetles gave 2 oz.
,, 5	100	1	...	¾	¾	Weather dry, no rain
,, 6	100	1	3	¾	3¾	
,, 7	100	1	3¾	1	4¾	,, ,,
,, 9	100	1	7	1¼	8¼	,, ,,
,, 11	100	2	6½	2	8½	,, ,,
,, 13	100	2	8	1½	9½	Morning tap
,, 13	100	2	6	1½	7½	Afternoon (1 p.m.) tap
,, 16	100	2	19½	2	21½	Rained all afternoon yesterday
,, 17	20	10	15¾	7	22¾	Rainy
,, 18	20	10	15	½	15½	,,
,, 19	40	5	19½	1	20½	
,, 20	20	10	15	4½	19½	
,, 21	20	10	15½	3	18½	
,, 23	100	4	65	2	67	
,, 25	100	4	77	4	79	
,, 27	100	4	96½	1½	98	
,, 30	100	4	96½	3	99½	
,, 31	100	4	80½	2	82½	
April 2	100	4	67	2	69	Rained the best part of the morning yesterday. No coagulants used on this occasion
,, 3	100	4	71½	2½	74	Flow of latex from one tree quite phenomenal

CASSAVA AND VELVET BEANS.

In feeding experiments the following has been the result in actual practice in Florida: On a 90-acre field of velvet beans, 300 cattle, valued at 12 dollars (£2 8s.) a head, were turned to feed it down. The beans cost 2·50 dollars (10s.) an acre to raise; the cattle doubled in weight, and cleared a net profit of 3,600 dollars (£720), and the 90-acre field was left rich enough to grow anything without manure or fertiliser. Cattle fed on cassava are found to double their weight in 72 days at a cost per pound of added weight of 1½ to 3 cents, (¾d. to 1½d.), valuing the roots at 5 dollars to 6 dollars (£1 to £1 4s.) a ton.—*Exchange.*

TRASHING CANE.

We have received the accompanying letter from Mr. Thos. Binnie, of Mango Farm, Cairns, on the above subject, which will be of much interest to sugar-cane farmers, and especially to those in the South. To the latter, because during June and July the sun's rays have lost much of their power to ripen the cane. The rains which occurred during June will also have had a retarding effect on the ripening, and, consequently, a considerable portion of the tops, which, under more favourable heat conditions, would have added to the weight of crushing cane, would not be available at all if left untrashed. Mr. Binnie says:—

In your June number you have a short article on cane trashing, and while you point out advantages, I think the main arguments in favour of trashing are £ s. d., and can be put as Dr. and Cr. Taking a 15-ton crop, trashing gains 1 ton per acre owing to being able to send in ripened tops instead of having to reject from 9 to 15 inches of cane full of glucose matter (some say 3 tons, but, although I believe I am under the mark, I take the low estimate of 1 ton).

Cutting is cheapened by 6d. per ton owing to easier handling, &c., and the cane gains at least 1s. per ton in value if payment is made by results—*i e.*, sugar contents.

I allow £1 per acre for trashing and stripping, which is high.

1 ACRE UNTRASHED CANE.

Dr.	£	*s.*	*d.*	Cr.	£	*s.*	*d.*
To cutting 15 tons at 2s. 6d.	1	17	6	By 15 tons at 12s. ...	9	0	0
„ Balance	7	2	6				
	£9	0	0				

1 ACRE TRASHED CANE.

Dr.	£	*s.*	*d.*	Cr.	£	*s.*	*d.*
To trashing and stripping	1	0	0	By 16 tons at 13s. ...	10	8	0
„ cutting 16 tons at 2s.	1	12	0				
	2	12	0				
To Balance ...	7	16	0				
	£10	8	0				

Net gain, result of trashing—13s. 6d. per acre.

I have taken a 15-ton crop so that my figures would be low, but heavier crops would show better results, the gain increasing very much in proportion to the tonnage. So that in addition to the many advantages already pointed out, you have a monetary gain of at least 13s. 6d. per ton.

[The second estimate shows 16 tons, the extra ton being the gain in weight of crushing cane from the ripened tops due to trashing.—Ed. *Q.A.J.*]

THE COTTON INDUSTRY.

Much has been lately written in the public Press on the subject of the possibility of reviving the cotton industry in Queensland. Unfortunately some writers on the subject have the impression that the cultivation of cotton in this State is as yet only in the experimental stage. Scarcely one who has approached the question has been able to give his personal experience of the industry. So far from its being in the experimental stage, it was for several years an apparently firmly established business. The soil and climate of the coast lands from Nerang to Cairns are proved to be admirably suited for cotton growing.

The first experiments in Queensland were made in the year 1860, when 14 acres were under cotton. Two years later there were 392 acres, which produced 14,344 lb. This was exported to Liverpool and sold at 1s. 11$\frac{11}{14}$d. per lb. In 1863, 2,021 acres yielded 31,557 lb., which sold in the home market for 1s. 11$\frac{1}{10}$d. per lb. In 1864, the amount of cotton exported was 38,730 lb., sold at 2s. 2$\frac{1}{4}$d. per lb. The following season gave 145,820 lb. exported, and sold at 1s. 8d. per lb. The highest yield was in 1871, when 12,962 acres were under cotton. The quantity exported in that year was 2,602,100 lb. of lint sold at 7$\frac{1}{3}$d. When the civil war in the United States of America came to an end, and cotton was once more largely grown in the Southern States, this time by *free-paid labour*, slavery having been abolished, the price gradually declined until it touched 6⅓d. per lb. for clean lint. The result was that in the year 1887 cotton-growing ceased in Queensland. There were other reasons for this abandonment of the industry. The Government bonus of £10, £5, and later on of £2 10s. on every bale of clean cotton exported, ceased. Work on the railways was well paid, farm labourers were hard to get, and wages were high. Rations and all domestic requirements cost nearly double the present prices. Freights were higher than they are now. From 3d. per lb. which the farmers received for their seed cotton, the price fell to 1½d. The whole of the seed, now so valuable—more so, indeed, than the lint—was thrown away. Still, cotton was grown on a commercial scale, especially in East and West Moreton, for 24 years. It cannot therefore be said that experiments are required to find out if cotton will grow and bear profitably in this State. The average yield of seed cotton has been 1,000 lb. per acre, and far more than this in numerous cases.

The main object of experiments in cotton to-day is to ascertain the best and most paying variety to grow, and to evolve by hybridisation an uplands cotton which shall have a longer staple than that previously grown in Queensland. Such experiments are now being made by the Queensland Acclimatisation Society, and in Egypt exhaustive experiments are being made with the same object in view.

We have already pointed out the shortage in American cotton which has caused almost a second cotton famine in Lancashire. The Americans are now establishing cotton mills all over the cotton-growing States, in order to manufacture the cotton on the spot. Consequently, England must look abroad for supplies, and where more naturally than in her own colonies?

We commend to the prospective and present cotton-growers of this State a careful perusal of the following address delivered before the Barbados Agricultural Society last February, by the Commissioner for Agriculture for the West Indies. In opening his address, the Commissioner said that he had visited all the West Indian Islands, where experiments with regard to cotton were being carried on; also, during his visit to the United States of America and Canada, (the latter country in connection with onion-growing) he interviewed a large number of men who are specially interested in cotton, and heard what they had to say in regard to the prospects of produce shipped from the West Indies finding a ready market. We give the address in the colloquial form in which it appeared in the *Barbados Advocate*, and in the pamphlet published by the Imperial Department of Agriculture for the West Indies, 10th February, 1903.

THE COTTON INDUSTRY.

A striking feature observed during my recent visit to the cotton belt of the United States was the erection of large factories for the manufacture of cotton goods. These factories are located in the middle of the cotton districts, and by their means it is proposed to work up a considerable portion of the cotton crop on the spot. I may add that the area under cultivation in cotton in the United States is over 20,000,000 acres, and the annual produce is about 10,000,000 bales of 500 lb. each.

There was also another feature. Since the setting in of low prices for cotton in the years 1894-8, the planters have been steadily organising their system of cultivation. They now devote greater attention to the raising of food and forage crops which they formerly bought from their northern neighbours. By these means they have strengthened their position, with the result that they command better prices, and the cotton industry is now placed in a more healthy condition than it has ever been.

The general trend of both these movements has been to reduce the quantity of cotton available for exportation from the United States to European countries.

The cotton manufacturers of Europe, hitherto dependent on supplies of raw cotton from America, are naturally becoming anxious as to the future. As you are aware, a shortage of cotton in Lancashire has led to many factories working short time, and a British Cotton Growing Association has been formed to encourage the cultivation of cotton in the colonies in order to keep up an adequate supply.

The revival of interest in cotton-growing in the West Indies is, therefore, based on circumstances that deserve the careful attention of the planting community. It is not unlikely that it may lead to the re-establishment of cotton cultivation in these colonies on a large scale, and make it pay . . . . Since 1901, cotton-growing in the Leeward Islands has been largely extended, and it is estimated that there are about 500 acres now under cultivation there.

CARRIACOU.

A small cotton industry has been carried on at Carriacou for a long period. It is mainly in the hands of small growers, and the crops are ratooned from year to year. They very seldom replant their areas; they simply supply vacancies. The exports in 1902 were 951 bales of cotton and 4,799 bags of seed. The price quoted last year for Carriacou cotton in the London market was 4⅞c. (nearly 2½d.)—5⅞c. (nearly 3d.) per lb.

ST. LUCIA.

The experiments at St. Lucia were started in January 1901 at the Rivière Dorée Experiment station under the charge of Mr. George Hudson, the Agricultural Instructor.

Mr. George Barnard gave valuable assistance in the matter, and undertook to receive the raw cotton from the small growers and to gin it at a small cost. With the assistance of a grant from the Imperial Department of Agriculture, the St. Lucia Agricultural Society obtained a Dobson and Barlow double-action Macarthy gin driven by horse-gear. This has worked successfully and turns out 40 lb. of clean lint per hour. A baling press was obtained from the Barclay-Lebby Company, of Charlestown, U.S.A., at a cost of £30. The St. Lucia Agricultural Society offered prizes to the value of £17 in 1901 and £22 in 1902 to peasant landholders for the best cultivation of not less than half an acre of cotton. It is estimated that 105 acres were under cultivation in 1902, and the prospects are regarded as so encouraging that a much larger area will probably be planted in 1903.

ANTIGUA.

The cotton plots in this island were started at Scott's Hill Experiment station under Mr. Francis Watts and Mr. Sands in August, 1901. The results were sufficiently encouraging to justify the department in introducing a small hand-power Macarthy gin. The cost, delivered at Antigua, was £12. Samples of cotton cleaned by this gin were favourably reported on by the Manchester Chamber of Commerce. The best prices were quoted for Sea Island cotton, viz., 8½d. per pound. In August last Mr. Watts read a paper before the Antigua Agricultural Society on Cotton Growing in the Leeward Islands, and gave valuable hints on the subject. As a result a committee of the society was appointed to co-operate with the officers of the Department of Agriculture in endeavouring to ascertain whether it was possible to establish a remunerative cotton industry, and to assist in experiments in cotton growing with seed supplied by the department.

MONTSERRAT.

An experiment plot of cotton was started by the department in August, 1901. The size of the plot was one-third of an acre. By the end of March the first crop had been reaped, and it yielded 351 lb. of seed cotton. Early in April, 1902 the plants were cut back to about a foot above the soil with a sharp cutlass, a dressing of pen manure applied (five tons) and spaded in, together with the dry tops cut off the plants, and a second crop was gathered which yielded 494 lb. of seed cotton, thus making a total of 845 lb. of seed cotton.

In addition, Messrs. Sendall and Wade, who are in charge of several sugar properties, started the cultivation of cotton in 1902 on a comparatively large scale. About 80 acres were beginning to bear in November last (1902), and the results were very promising Cotton is also being cultivated on the windward side of Montserrat, making a total of about 120 acres on that island.

ST. KITT'S.

I hear there is a total area of 324 acres under cotton cultivation to be reaped in the early part of 1903. Gins driven by steam power, and presses were in course of being ordered, to clean and pack the cotton ready for shipment.

BARBADOS.

Experiments in growing cotton at Barbados was recently started. Sample plots of cotton are being cultivated on twenty-four estates, covering 16 acres. The specimens to-day are evidence of the luxuriant growth of the plants and the high character of the produce. They fully justify the extension of the present experiments with the view to affording data as to the prospects of the industry on a commercial scale. . . .

There is a valuable book called "Cotton Planting," published by the United States Department of Agriculture in 1896. It contains a large amount of very useful information on the growing of cotton, about the difficulties of dealing with it in various parts of the United States, about the insects and fungi that infest cotton; about the marketing and the general treatment of the product. There is another book. It is called "Cotton—Its Uses, Varieties, Yield, Climate, and Cultivation," by Brooks, published in London and New York. The drawback, however, to these books is that they deal with the treatment of cotton in temperate countries only.*

We require to work out our system of cultivation for the West Indies, and the experiments that are now going on will enable us not only to put on record what are considered the best methods of cultivation, but also what are the principal results likely to arise. At the present moment it is difficult for any one to say what are likely to be the actual returns from the cultivation of cotton on a commercial scale in any part of the West Indies. When the estates on which the experiments are now being carried on have finished their crop and sold their cotton,they will then be in a position to give us information of a reliable character.

I would now discuss a few points connected with the different varieties of cotton and their cultural requirements, picking, ginning and baling, by-products, &c.

VARIETIES OF COTTON.

The more widely cultivated variety is that known as Upland cotton. The plants are usually low bushes and the cotton is short stapled, the lint being not more than two or three times the length of the seed (about ·93 inch.) What is known as Sea Island cotton is a special variety described as a native of the West Indies. It has a fine, long, silky lint (1·61 inch), three or four times the length of the seed. It is cultivated on a small scale only in the islands off the coast of Georgia and Carolina. It is seldom profitable to grow this in localities more than thirty miles from the sea.

The Sea Island cotton is recommended for trial in the West Indies side by side with the best varieties of Upland cotton. The return of Sea Island cotton is usually less than that of Upland cotton, but the increased price obtained for it more than compensates for the diminished yield.

SOIL AND CULTIVATION.

In regard to soil, there is no difficulty likely to arise, as cotton is at present cultivated on nearly all kinds of soil.

On sandy soils the yield of cotton is usually small. On clay land, especially in wet seasons, the plants attain a large size, but yield a small amount of lint in proportion to their size. The best soils for the crop are a medium loam. In the United States 4 feet is the usual accepted

*This is not a drawback as far as Southern Queensland is concerned.—Ed. *Q.A.J.*

DISTANCE BETWEEN THE ROWS,

and the distance between the plants is within the limit of 8 to 14 inches. Experiments made at the Georgia Experiment Station for five years to determine the best distance between cotton plants indicate that on land so rich, or so well fertilised, as to produce $1\frac{1}{3}$ bales (660 lb.) of lint per acre, the best distance is 4 feet between the rows, and 1 foot apart in the rows. In Carriacou cotton is planted in rows 3 feet apart and $2\frac{1}{2}$ feet in the rows. This is probably too far in the rows. The planting season commences in the States in the spring of the year, just as all danger from frost is over, and the time the crop takes to mature varies from 120 to 157 days. The reaping season is about thirty days more—viz., in July, August, and September. That would be about twenty-six weeks or six months for the whole crop.

In 1 lb. of cotton seed there are about 3,800 to 4,000 seeds. At three seeds to a hole 1 lb. would plant about 1,250 to 1,300 holes. For fields planted in rows 4 feet apart and $1\frac{1}{2}$ feet apart in the rows, from $5\frac{1}{2}$ lb. to 6 lb. of seed would be required to plant an acre.

The seed, after the oil is extracted, contains a large proportion of the manurial constituents required by the plant. On the average of 204 analyses of this meal it was found to contain 6·79 per cent. nitrogen, 2·88 per cent. phosphoric acid, and 1·77 per cent. potash.

Cotton-seed meal is also one of the most valuable of the meals used for feeding live stock. If cotton-seed meal and the hulls are returned to the soil, there will be hardly any necessity of applying other manures, and the most advantageous way of doing this is to feed the meat and hulls to the animals, and to apply the resultant manure to the land.

TIME TO PLANT.

For the West Indies it is probable that the best time to plant cotton will be in July and August.* The crop should then come in early in December and January, and be completed, say, by the end of February. Close planting will have a tendency to produce an early crop, and wide planting the reverse. If local seed is intended to be used for planting, it should be selected with great care from strong and heavy-bearing plants. By this means, a special race of cotton might be raised to suit local conditions.

PICKING.

With regard to picking cotton in the West Indies, the people may not be able at once to pick large quantities per day. The difficulty is to remove the lint quickly and completely. When the pickers go into the field, it is necessary to place three fingers into the pod and remove the whole of the cotton at once, leaving the pod perfectly clean. At one time, it was thought that 100 lb. per day was a fair average, but that is now considered rather small. In fact, there are keen and experienced pickers in the United States able to pick as high as 300 lb. of cotton a day. I saw women moving between the rows, picking the cotton, and putting it into large pockets in their aprons. When they got to the end of the rows, they emptied the cotton into bags or baskets. These were again emptied, and the cotton taken, after drying, to the ginning house. In some cases, dependent on the climate, it is necessary to give the cotton an extra drying before it is put through the gins.

As regards the quality of the cotton grown here, the specimens are before you, and you will be able to judge for yourselves. The Sea Island cotton, which is a native of the West Indies, is, of course, double value, owing to the length and silkiness of the fibre.

YIELD AND COST.

According to a Texas station bulletin, No. 26 of March, 1893, the average yield on seven farms was 392 lb. of lint, the average selling price 8 cents per

* In Queensland, cotton should be planted in September, or in early districts, at the end of August. In March the picking season begins.

lb., the expenses per acre 16.96 dollars, and the profit 14.60 dollars. The cost for ginning, packing, &c., being paid for by the value of the seed.

Again, in Texas, in 1892, the average cost of growing cotton on twelve farms was 22.62 dollars per acre, the lint was 415 lb., the price of lint was 9·6 cent per lb., and the average net profit per acre 15.77 dollars. No charge for management was made, with the exception of one farm. It is stated that "the profit was large—larger perhaps than any profit from any staple cultivated on so extensive a scale."

In these colonies the cost of producing cotton should be less than in the United States. The estate system of cultivation for sugar-cane would exactly suit cotton; and, if the lighter soils not so remunerative for sugar were planted in cotton, the results might be of distinct advantage to the planting community. There would also be added in some of these colonies an important auxiliary industry to those already existing.

BY-PRODUCTS.

The by-products of cotton comprise four separate articles, namely: (1) linters, (2) oil, (3) meal, and (4) hulls. If you obtain a return of 1,200 lb. Sea Island cotton per acre you will have 400 lb. of lint and 800 lb. of seed. The proportion is exactly 1 to 2 by weight. If you examine the seed of the cotton you will find that the outside of it is covered with a crust or husk. If you break this you come to a whitish substance called the kernel. In factories dealing with cotton seed they first of all remove the fine linters on the outside of the seed. Next they decorticate the seed and remove the hull—that is, the hard crust on the outside. That was at one time thrown away; now it is ground into a kind of bran, which is found useful for feeding animals. The kernel contains a large proportion of oil. A ton of seed contains about 50 gallons, but at present they can only extract about 45 gallons of this oil. When they have extracted the oil, they have left a cake or meal also valuable for feeding purposes.

With regard to the percentages of the various parts of the entire seed, the meal will be 34 per cent., the oil will be 20 per cent., the linters will be 35 per cent., and the hulls 10 per cent. A more definite idea will be obtained if we calculate the amount of each which would be obtained from the average yield of an acre of cotton. This we will take as 900 lb. of seed cotton yielding 300 lb. of lint and 600 lb. of seed.

On this basis we should obtain (besides 300 lb. of commercial lint) from 1 acre:—

Meal	205 lb.
Oil	120 ,, or about 15 gallons.
Hulls	215 ,,
Linters	60 ,,

CARAVONICA COTTON.

We have received an interesting letter on this new variety of cotton, from Dr. D. Thomatis, of "Caravonica," Cairns, describing how he succeeded in producing it by hybridisation. It will be good news to those interested in cotton-growing to learn the prices which have been offered to Dr. Thomatis by Italian cotton-spinners. If such prices as 9d. and 10d. per lb. are obtained for the clean lint, growers of this variety of cotton have a splendid field before them, for in addition to the lint there is money in the oil extracted from the seed, and in the residue as oil-cake. The doctor says that he believes this variety of cotton can only be successfully produced in the tropical parts of Queensland, but it may be proved that, as the heat of the sun during the growing season in the Central and Southern districts is considerable, it will thrive and bear as well there as in the far North.

The letter is as follows:—

CARAVONICA COTTON.

In your last issue, July, I read a very interesting article on "The Cotton Industry," in which you particularise the economical aspect of the cotton culture. In a footnote, page 45, you state that you have been given "to understand that Dr. Thomatis, at Cairns, has been offered 6½ per lb. for his Uplands cotton in England." Outside of small samples of the various kinds of cotton collected by me from Queensland, New Guinea, Fiji, Samoa, and Tahiti, for the British Cotton Growing Association, no other cotton, Uplands or others, was sent by me to England, except of my own new variety "Caravonica" cotton, obtained by me by crossing two Sea Island varieties,—viz., one from Mexico (a true *Barbadense Gossypium*), and the other from the valley of the Upper Amazon, near the boundary with Peru. After careful research and investigation I chose two such varieties of Central America, which, while suitable to Queensland as to climate, would produce a cross or new progeny possessing all the best points in cotton—viz., length, strength, and regularity of fibre. The Mexican variety was for length and fineness and gloss; the Amazonian for strength and length.

I fully succeeded in getting all the points I wanted in the new variety as testified by the most eminent cotton experts of England, France, Italy, Germany, and Hungary. The experts of the new "British Cotton Growing Association" pronounced the Caravonica cotton to be of "long, strong, and regular staple, rather lacking in finess," and of all the qualities of cotton collected by the said association from all parts of the British empire, the Caravonica cotton was adjudged the most valuable, surpassing even a special variety specially crossed by the eminent Dr. Morris, C.M.G., formerly Director of Kew Gardens, and now British High Commissioner for Agriculture in the West Indies. He called this variety "Sandy Lane," and its value was fully 25 per cent, less than the Caravonica variety, which I can sell in any quantity at 9d. per lb. ginned. Messrs. Allison and Co., cotton brokers, of Liverpool, pronounced my cotton "really excellent, and opening a grand future in cotton culture." The Minister of Agriculture of France declared it "equal to wool, and therefore most valuable." The Associated Cotton Spinners of Italy declared it "excellent in every respect, and better than the best of American cottons," and backed their opinion most practically by giving me an order for 6,000 bales at 8½d. per lb., or if not enough to submit my own price delivered at Genoa; and they even started interesting themselves in my cotton by issuing a circular amongst farmers with the view to selecting large families to come out to Cairns to grow my Caravonica cotton for their mills. The Ministers of Agriculture in Germany and in Hungary are also enthusiastic on this new variety, and are prepared to buy all the cotton I can grow for the mills of their countries The news of the valuableness of my new variety has already spread even in the very countries whence I got its parents, and I am informed that several Brazilian coffee-growers will soon substitute Caravonica cotton for coffee on their estates, and I should not wonder if soon millions of acres will produce millions of cotton bales instead of the 14,000,000 bags of coffee. Brazilians are energetic and very unlike us in Queensland, where we politically wrangle for years discussing whether whites can grow cotton payably, and whether women or children should pick cotton and work in the most picturesque cotton groves! In fact we discuss and discuss how not to do or not to grow anything! I have already 10 acres of the new variety in full bearing and over 50 acres planted; and but for the late disastrous flood the acreage would be double; and, moreover, I have leased to "white families" over 170 acres on the express condition of growing cotton or coffee.

I met great sympathy and encouragement from His Excellency the Governor Sir H. Chermside and from the Queensland Acclimatisation Society, whose energetic secretary, Mr. E. Grimley, has been supplied with all particulars at his request. The Caravonica variety grows in big trees, very prolific, large bolls (70 to the lb.), of which 28½ per cent. is clean lint and 71½ per cent. seeds, which are black and perfectly clear of floss. Each tree, when two years old, will bear about 400 bolls on an average, and there are about 800 trees to the acre (7½ feet apart), so that an acre will give over half-a-ton of ginned cotton. I expect to sell my ginned cotton at 9d. per lb. and more, besides the value of the oil from the seed. I reckon as an average on a gross income per acre of about £40, and the net not less than £30. So you will now see the superiority and the payableness of my new Caravonica variety over all the present known kinds of cotton. In your issue of July you reckon the income per acre at something between £5 and £7. In India the crop is about 100 lb. of lint per acre. You reckon the crop of clean lint in Queensland to be about 400 lb. per acre, at 6d., while my Caravonica variety will give over 1,200 lb. of clean lint, or more than treble, and at a higher price. This is the variety that is payable for "white families"; this is the variety that will establish a true "white Australia" practically on the field, and not merely the artificial on paper! I am sending seed of this variety to all parts of the world at 10s. per lb.; 1 lb. will suffice for 2 acres. Besides our own North Queensland, the Northern Territory and Northern districts of Western Australia should become large cotton-fields of this variety, as I fear it will not thrive well outside the tropics. This ought to be a splendid patriotic enterprise for our Federal Parliament and our various State legislatures. Cotton culture is payable for white settlers with families if the *best* variety is cultivated, both for prolificity and value, as its culture will be no more expensive than for a bad variety. Inferior qualities of cotton should be left to coloured races working for 2d. a day, as in West Africa, and our old England will soon find out that the best cotton, like the Caravonica, will meet and satisfy her requirements much better than rubbish cotton from the African possessions.

(Signed) DAVID THOMATIS.

Caravonica, 17th July.

COTTON IN THE WEST INDIES.

The *Agricultural News* of Barbados publishes two letters on the subject of cotton growing. The first is a letter from the secretary of the British Cotton Growing Association to the Commissioner of Agriculture for the West Indies, to the following effect:—

You will be pleased to hear that we have had two small consignments of cotton, grown at Montserrat, both of which were very satisfactory. The first was sold at 10d. and a part of the second at 11d., and we hope to clear the remainder at the same price. My committee will be very pleased to receive consignments from other growers There is no doubt that the class of cotton which can be grown in the West Indies will secure a good market here. Cotton should be consigned to Liverpool or Manchester by direct steamer, as this saves a considerable amount of carriage. The cost of transit from Southampton to Lancashire towns is 38s. 7d. per ton against 9s. 2d. from Liverpool. This is a serious item.

The second letter relates to a supply of Peruvian cotton seed sent to Barbados by Messrs. Praschkauer and Co., 112 Fenchurch street, London. That firm gave the following particulars of the seed to the Colonial Office:—

We take the liberty of sending you herewith sample of a class of cotton seed that we believe is unrivalled in any part of the world. The seed comes from a particularly favourable spot—namely, northern Peru—and is shipped to Europe only very occasionally. The cotton produced there has always realised the very highest price of any; we therefore consider it to be of special value for acclimatisation purposes in the West Indies or in any tropical and subtropical countries with which your office is connected.

It is possible that this is the same variety of cotton as that used by Dr. Thomatis in his evolution of the new cotton called "Caravonica," as described in his letter in another part of this *Journal*.

Science.

TO CALCULATE THE YIELD OF MANURE FROM THE POUNDS OF FOOD EATEN BY A HORSE, COW, OR SHEEP.

Is it possible, asks a correspondent, to arrive at the amount of manure which a given quantity of fodder fed to an animal will yield?

The answer to this question is supplied by a chapter on the subject by Professor F. H. Storer, S.B., A.M., Professor of Agricultural Chemistry in Harvard University.

He says:—The amount of manure produced by animals may readily be computed approximately from the amount of food which they have eaten (or are to eat), and the quantity of straw that is employed for bedding them. Heiden has given several instructive examples of this method of computation. In the case of horses, it appears that some $47\frac{1}{3}$ per cent. of the dry matter of their food passes out from them in the solid and liquid excrements, and that the percentage of water in these excrements amounts to $77\frac{1}{2}$ on the average; so that, in the total excrement, there is about 22.5 per cent. of dry matter. Whence it appears that, from every 100 lb. of dry matter eaten, 210 lb. of fresh manure will be produced—

$$22.5 : 100 : : 47.33 : 210$$

or, for each pound of dry matter in the fodder, there is obtained rather more than 2 lb. of manure. In case the animals were standing all the while quietly in their stalls, the weight in pounds of fresh excrement produced by them would be got by simply multiplying the number of pounds of dry matter in their fodder with the factor 2.1. To the product thus obtained would be added the number of pounds of straw that have been expended in bedding the animals, say $6\frac{1}{2}$ lb. per diem on the average. But in case the animals are worked there must be subtracted whatever dung or urine have been dropped outside the stables.

If, for example, it be assumed (with Heiden) that a horse works 260 days of 12 hours each in the course of a year, or 130 whole days, it may be admitted that 235 days have been spent in the stalls; and by multiplying this number with the daily product of dung, as above obtained, and adding the yearly expenditure of straw, there will be got an approximation to the yearly product of manure. Heiden makes out in this way that a well-fed working horse will produce about 50 lb. of manure a day, or some $6\frac{1}{2}$ tons in the year, as above stated. Of course, much must depend on the liberality with which straw is used for bedding the animals.

In the case of cows or other neat cattle, it has been observed that the animals void some 48 per cent. of the dry matter of the food in the liquid and solid excrements, and that the fresh excrements contain on the average $87\frac{1}{2}$ per cent. of water and $12\frac{1}{2}$ per cent. of dry matter. But—

$$12.5 : 1 : : 48 : 3.84,$$

so that, in this case, we have the factor 3.84 with which to multiply the number of pounds of dry matter in the fodder in order to obtain the number of pounds of fresh excrement. To the product of this multiplication must be added, as before, the straw used for bedding, which, for animals kept in stall, should amount, according to Heiden, to not far from one-third the weight of the dry matter of the fodder.

Hence, an ox of 1,000 lb. weight, consuming 27 lb. of dry matter per diem, will produce in a day $(27 \times 3.84) + 9$ lb. of manure—*i.e.*, nearly 113 lb. And in a year he will produce some 20 tons. In the same way it may be concluded that young cattle of 500 lb. weight, consuming 16 lb. of dry matter per diem, will produce in a year 12 tons of manure apiece.

Where cows are pastured in summer, or where they are kept up of nights without bedding, allowances must, of course, be made both for the time they are absent from the stable and for the straw that has been saved.

For sheep, it may be assumed that $49\frac{1}{3}$ per cent. of the dry matter of the food goes into the excrement, and that the fresh excrements contain 73 per cent. of water and 27 per cent. of dry matter. Hence, the factor 1.83, which, when multiplied into the dry matter of the fodder, will give the weight of the fresh excrement, for—

$$27 : 1 :: 49.33 : 1.83.$$

Here, again, the weight of the straw used for bedding must be added to the product of the multiplication. Thus, a 60-lb. sheep, eating 2 lb. of dry matter daily, and bedded with three-fifths of a pound of straw, will produce about three-quarters of a ton of manure in a year. The amount of manure would naturally be less in case the animals were pastured or bedded only a part of the year. For sheep in fold, the daily product of manure may be got by simply multiplying the number of animals by 3.7 (equal to 2 lb. of dry matter, multiplied by 1.83), as before.

MANAGEMENT OF MANURES.

The farmer is often at a loss to know what fertilisers to mix with safety without deleterious chemical combination taking place. The following should not be mixed:—

Farm yard manure, or dung with lime, or basic slag.
Nitrate with phosphatic slag.
Nitrate with superphosphate.
Sulphate of ammonia with phosphatic slag.
Superphosphate with slag.

Those that can be mixed with safety are as follows:—

Sulphate of ammonia with superphosphate.
Nitrate with bones.
Sulphate with bones.
Bones with slag.
Nitrate with phosphatic guano.
Sulphate with phosphatic guano.

At times some of the chemicals have a tendency to "set"—*i.e.*, nitrate of soda and kainit, and thus have to be powdered again to enable them to be sown. Rub and, as soon as mixed, apply to land. Keep as dry as possible until then. —*Farmer and Stockbreeder.*

A LIVING LAMP.

A Reuter telegram from Vienna, dated March 15, says:—"Professor Hans Molish, of Prague, has reported to the Vienna Academy of Sciences the discovery of a lamp lighted by means of bacteria, which, he claims, will give a powerful light and be free from danger, thus being valuable for work in mines and powder magazines. The lamp consists of a glass jar, in which a lining of saltpetre and gelatine inoculated with bacteria is placed. Two days after inoculation the jar becomes illuminated with a wonderful bluish-green light, caused by the innumerable bacteria which have developed in the time. The light will burn brilliantly from two to three weeks, afterwards diminishing in brightness. It renders faces recognisable at a distance of two yards, and large type is easily legible by it. Professor Molisch asserts that the lamp yields a cold light which is entirely safe."—*The Times.*

Entomology.

GRASSHOPPER DESTRUCTION.

[By HENRY TRYON, Entomologist and Vegetable Pathologist.]

With regard to methods for grasshopper destruction to be employed against the varieties of these insects that occur in swarm, and hordes, both in pasturages and amongst cultivated crops, it must be borne in mind that, in order that these may be efficacious to any extent, they should be put into operation prior to the winged condition having been attained; and that these earlier phases of existence being oftentimes passed through in spots remote from those in which their devastations are subsequently wrought, they must be sought out and assailed by these methods thus early, not only when occupying the scenes of those destructive habits that have called attention to their prevalence, but in these places especially before others.

In the first place, endeavour should be made to discover the sites selected for the deposition of the eggs from which the grasshopper-swarms originate. These sites are generally found to occur in spots slightly raised above the general level of the surrounding land, and may be on hard comparatively bare ground. They have been remarked occurring in such positions along the margins of well-travelled roads, for instance. Their location is indicated by a peculiar appearance of the soil, that is suggestive of its having been surface-tilled or scratched over; or by the presence of dead or still living grasshoppers; in each case with their hind bodies forced into the ground, after having deposited or whilst depositing their eggs. In these situations grasshopper-bores, each occupied with several ova, may be found honey-combing the soil, as many, in some instances, as 200 to the square foot. On the detection of these places the eggs should be dug out and destroyed, a work easy of accomplishment and of great importance in grasshopper-repression.

After the eggs hatch, many days elapse before the winged condition is attained by the insect, after several successive moultings of the skin. During this period locomotion can alone be effected by jumping and crawling, and so the area occupied by the swarm is relatively small, gradually extending as the time since, this has taken place, increases. For the same reason the grasshoppers may be met with in numbers at a considerable distance from the crops that may afterwards suffer from the visitation of the winged host. Accordingly, should it have been found impracticable to discover and deal with the egg-masses, operations may well be directed at the commencement to locating these swarms and promptly attacking these.

It is practicable to destroy the insects at this time, both by mechanical contrivances and by poison; the latter being especially efficacious for young grasshopper destruction.

The mechanical devices may take various forms, but are constructed on much the same principle. A contrivance being devised, consisting of an upright and a horizontal portion, the former being constituted by some cheap fabric stretched on a framework, and the latter by a shallow tin capable of holding water covered by a thin layer of kerosene, or by a sheet of iron covered with tar or other caustic and sticky substance, on or into which the young insects will fall on striking, whilst on the hop, the former or perpendicular part. This appliance—that, with the modifications it will admit of, cannot be more particularly described without illustrative figures—may be several feet in length, and may be drawn by a horse that is directed again and again through the swarms.

In poisoning the grasshoppers (the method from which the best results in coping with these injurious insects may be anticipated) some regard must be had to the appetites of the particular species against which the work is being conducted, as efficacy oftentimes largely depends on the attractiveness of the bait, and this may vary with the one concerned.

The following method, adopted now largely in South Africa, will probably be found in most cases the most effective in dealing with young grasshoppers:—This involves the spraying, by aid of a knapsack spray pump, upon the herbage being consumed by the wingless insects a special mixture composed of the following ingredients present in the proportions named—*i.e.*, arsenic, 1¼ lb.; washing soda, 1¼ lb.; molasses, 1½ gallons; water, 8 gallons. These are incorporated by boiling the arsenic and soda in half the quantity of water spoken of, then adding the molasses while stirring, the whole being diluted with the remaining water on or after being taken to the place where its employment has been decided upon. This mixture, that both allures and kills the "hoppers," also damages the vegetation whereon they are feeding. The latter then can without loss be burnt over when the poison application has done its work, which will be after the lapse of twenty or thirty hours; and so one of the possible ill-effects consequent on employing an arsenical preparation avoided.

A somewhat cheaper method, based on the fact that horse manure has a special attraction for many kinds of grasshoppers, and which is now used in the wheatfields of Manitoba, as we learn from the Dominion Entomologist, Dr. Fletcher, may be directed both against the "hoppers" and those grasshoppers that are already winged. In this the dung (the fresher the better, although horse manure several days old may still be used) is mixed in a wooden tub—or half barrel—with salt and Paris green. These ingredients being in the proportion of one part of Paris green, two of salt, and thirty-five to forty of horse manure (by measure), water being added while stirring until the whole is soft, but not sloppy. This mixture is then taken out into the field in a cart, and sprinkled with a trowel over a width of from 20 to 30 feet in advance of or immediately surrounding the marauders.

Bran or sharps, well mixed with Paris green until just coloured by the latter, and then moistened whilst being stirred with molasses and water to a sufficient degree to admit of its holding together in little pellets, may be similarly employed. Again, in the case of sugar-cane lands, it will be found practicable and advantageous to substitute megass for bran, as is done by my colleague of Natal, Claude Fuller, in like case.

Even strong soap-water—1 bar of soap to 8 gallons of water—is, as reported, destructive to young grasshoppers when sprayed upon them, and may be employed in circumstances of emergency.

By those who object to the use of arsenical preparations, Stockholm tar and soda wash, elsewhere described by the writer, and as manufactured after the method of Brünnich for cattle-dipping purposes, may be employed as an agent in young grasshopper destruction, killing them by contact and not through ingestion.

For it must be borne in mind that substances containing either pure arsenic or Paris green—a derivative of it—are highly deleterious to all animals, especially to poultry and birds generally, and must be employed with this understanding. Hence the use of the bran and Paris green, and meal and Paris green, can only exceptionally be resorted to.

At the same time we have in poultry, and in turkeys especially, most voracious grasshopper destroyers. Turkeys in Queensland have been known to so diminish swarms of young grasshoppers as to render their capacity for destruction comparatively insignificant. It will accordingly be highly advantageous to maintain on farms mobs of turkeys that may be guarded or confined during the short period during which the wheat is ripe and being harvested; but oftentimes the tribute in grain, which they will exact from the standing crop in return for their services, is one that the farmer can well afford to ignore.

Again, both larkspur and castor-oil plants are poisonous to grasshoppers; the latter, however, not invariably so, some species feeding on them with impunity. Accordingly, these insects, which as a rule are not respecters of variety or species in leafy vegetation—consuming, oftentimes, "every green thing" that they encounter—will, in passing through these, when already planted in anticipation of their visitation, be poisoned by them.

For further facts relating to grasshoppers, and the means for their extermination, a work entitled "Insect and Fungus Pests," published by the Department of Agriculture in 1889, and emanating from the present writer, may be consulted. (*Vid.* Op. Cip., pp. 217-223.)

From the foregoing remarks; and, in view especially of the statement that the damage experienced by a farmer usually results from hordes of grasshoppers that have come into existence in places—often in waste lands—far away (perhaps miles distant) from his holding, and that it is in these that they can be most expeditiously and effectively dealt with, and in most cases only in these; it will appear that the grasshopper pest is one that can be best contended with by co-operative effort, as formerly recommended in the case of the grub pest of sugar-cane, and now so generally recognised in that connection; and by the expenditure of money contributed to a common fund; such expenditure to provide—as a matter of great importance—for payment for the discovery of the spots where egg-laying has recently taken place, or where swarms of young grasshoppers already occur. In all cases early and drastic methods of procedure are indicated.

WHITE ANTS.

In response to a letter from Mr. S. S. Bassett, of Roma, to the Under Secretary for Agriculture, *in re* the destruction of vines by white ants, Mr. H. Tryon, Entomologist and Vegetable Pathologist to the Department, writes as follows:—

With reference to Mr. S. S. Bassett's complaint set forth in his communication of the 4th instant (8349-03) that White Ants (*Termitidæ*) had occasioned great destruction, two years since, to grape vine cuttings after these were planted, and to his inquiry—in view of the possible repetition of a similar occurrence—as to whether the Department had tested the efficacy of kerosene, kerosene and tar, kerosene and turpentine, or similar substances, used as an application to the cuttings, and by way of a preventative to the attacks of these plant marauders, I have the honour to intimate that the Department has not done so. Moreover, it may be mentioned that like complaints on the part of vignerons, and relating also to experiences in the Western district of Queensland, have been common; but notwithstanding, there is no evidence of the successful use on their part of precautionary measures of the class alluded, as being possibly serviceable for the purpose named. And, judging from the experience of agriculturists elsewhere, it is not considered that they would prove efficacious; whilst, from the well-known qualities of the substances specified, there are grounds for concluding that these at least, if used in such quantity as is required when deterrents are employed, would themselves injure the cuttings submitted to their action.

However, it may be pointed out that, in order to indicate the method or methods to be adopted under any given circumstances, such as Mr. Bassett has in view, it would be expedient that the particular kind or kinds of white ants that frequent his vineyard be ascertained. To this end specimens—embracing especially the soldier or large-headed individuals—should be procured and forwarded, either alive in soil or drowned in diluted alcohol, for examination and identification.

This primary question having been settled it may be possible to discover the nests or termitares, whence the attacks originate, and, on doing so, break up these and so subject their denizens to the destruction that exposure occasions.*

The successful employment of poisons (*e.g.* one composed of arsenic, washing soda, and molasses) against the white ants, moreover, will be best accomplished when this knowledge is forthcoming.

With reference to white ants generally, and to certain species especially, there are grounds for concluding that, in most districts, there will be found to occur certain trees, either not favoured by or positively obnoxious to them, and that accordingly sawdust derived from these would, if placed in the soil immediately surrounding the plants, in a great measure protect them.

At the same time it must be admitted that, as far as Queensland is concerned, it has not been experimentally demonstrated that a method so constituted can be successfully employed; the exceedingly complicated inquiry relating to the life-histories and habits of termites having been scarcely entered upon.

It has, however, been discovered with regard to a special White Ant (*Termes taprobanes*) and its occurrence in British India that both castor oil cake and a substance derived from a Gardenia (*G. gumifera*) named in the Central Provinces "Kamali" possess the abovementioned qualities, and are accordingly utilised in protecting growing plants; the former especially in the case of sugar-cane sets, to which the abovementioned termites are very destructive; and it and the latter—as forming the principal ingredients in the so-called Gonda Fluid—in securing immunity from white ant attacks to fruit trees.

Reverting to the method of coping with white ant attack, consisting in the extirpation of their pests or termitaries, it may be stated that it will possibly happen that the presence of these in many cases is not indicated by any structures occurring above ground. Even a species of white ant, that in one part of the State is in the habit of constructing a conspicuous abode, in

*The latter also may be readily killed by applications of bisulphide of carbon to the nests.

another pursues an entirely subterranean existence, and of asserting its presence almost entirely by means of the destructiveness that is the outcome of its habits of life. Again, there are white ants whose communities, although numerous, are composed of few individuals, and are so easily overlooked. These facts constitute some of the difficulties attendant on the prosecution of this method.

Accordingly in the Straits Settlement, where white ants not only injure coffee-trees, but are the principal insect enemies in the rubber plantations, the destruction of the discoverable nests, although sometimes attended with marked benefit, is not invariably so in all locations.

In these exceptional cases, good results are reported as having been obtained there, from deep digging and consequent breaking up the subterranean channels of communication through the soil, that the white ants avail themselves of in visiting the scenes of their destructive habits. Where the cost of labour has not been sufficiently great to prohibit such action, the entire plantation has been subjected to this treatment. In other cases, it has been confined to limited areas surrounding the trees that are being attacked.

These facts may suggest, in some cases, a course of procedure applicable to the conditions of a Western vineyard, and with equally satisfactory results.

Where irrigation can be resorted to, the destruction of white ants can readily be accomplished by repeated watering. Heavy rainfalls will accomplish this also spontaneously. This remark does not apply, however, to white ants already within their nests, which are usually impervious to water.

Indeed, it may be remarked, that when the rainfall is at all generous, and continuous growths in the plants can take place, from the time of setting out the cuttings onwards, little is to be feared from the attacks of termites that, under other circumstances, may prove sufficiently destructive to render all cultivation of woody plants impracticable. Thus it happens that in a normal season the depredations of white ants—either in orchard or vineyard—are seldom matters of complaint.

This absence of arrested vitality, moreover, affords the explanation of the common experience in this State, that plants raised from seed or already rooted and well cared for—in the matter of watering—on being planted, are victimised by or succumb to the depredations of white ants far less frequently than do those that are originated by cuttings, and especially such as are left to shift for themselves.

That no more definite procedures can at present be indicated, arises from the fact that the particular kinds of termities taking place in these depredations have not been ascertained, as already pointed out. It is also consequent on the difficulties, that the problem of white ants in their relation to growing plants presents, and which—though recognised all the world over—can nowhere be satisfactorily dealt with until the obscure habits of these remarkable insects are further revealed and understood, as the outcome of patient investigation.

Tobacco Notes.

By R. S. NEVILL.

THE MACEDONIAN CROP.—The political disturbances in Macedonia threaten to injure, if not ruin temporarily, the famous Turkish tobacco business of that province. In 1902 the output was 25,000,000 lb. of leaf. Prior to last year the chief buyers were the Regies of Turkey, Austria, Hungary, Italy, and France; but in 1902 the American Tobacco Company entered the market, and became the chief buyer.

NEGROES TO MANUFACTURE TOBACCO.—In line with a policy announced by Booker T. Washington at a negro convention held at Richmond (Va.) a few months ago, it is said that a factory for the manufacturing of all kinds of tobacco will be operated and controlled exclusively by negroes. This is one of many enterprises proposed by Booker T. Washington for his race. It is reported that Andrew Carnegie is backing the enterprise.

GOVERNMENT HAS DECIDED TO LOCATE BIG TOBACCO PLANT IN TEXAS.—It is stated that the Department of Agriculture at Washington has decided to locate at Nacogdoches, Texas, on the line of the Southern Pacific, the largest tobacco experimental station in the world. On 1st August a plant for the curing of all tobacco grown at experimental stations in the various Southern States will be opened, with the leaf tobacco experts of the Agricultural Department in charge. Government tests have demonstrated that tobacco can be grown on Texas soil.

THE SEVENTH INSCRIPTION.—At the seventh inscription held at Amsterdam, 7th July, 18,235 bales of Sumatra and 2,166 bales of Borneo were offered for sale. Of these 2,700 bales were bought by Americans at from 90 cents to 250 cents for both firsts and seconds.

THE CARE AND CULTIVATION OF TOBACCO.—Speaking from an experience of the past fifteen years, I will say (says J. W. Burge in the Sampson (N.C.) *Democrat*) :—Tobacco is a very quick crop, and should have rapid cultivation. I have found it to be very important and profitable to cultivate very deep, and at least every ten days, until it is topped; it should not be neglected until it gets grassy to work it. Keep it stirred often, and you will get good results. After it gets too large to run close to it, the plough should be run in the middle. By so doing you keep it from firing up until it gets its normal weight and growth.

Tobacco seed may be sown in the coastal country until December, care being taken to shade seed beds; otherwise the plants will be killed by the hot sun as fast as they appear above ground. When the plants have leaves the size of a sixpence, the covering may be removed gradually; an hour or two at first, and then a little longer each day until the plants are hardy enough to leave it off altogether.

Only cigar tobacco seed should be sown below the coastal range. Tobacco fields should not be nearer the coast than five or six miles. Transplanting below the range may continue to 1st February.

EDWARDS, GOODWIN, AND CO.'S MONTHLY TOBACCO REPORT.

27, Gradwell street,

Liverpool, 30th May, 1903.

Stocks—1st June, 1903 ... ... 118,597 hogsheads.

Prices.

STRIPS.	1903.	1902.
WESTERN—		
Fillers	— @ 5	— @ 5 @ —
Rather short	5¼ „ 5¾	5¼ @ 6
Very middling to middling	6 „ 6¾	6¼ „ 6¾
Good to fine	7 @ 7½ @ —	7 @ 8 @ —
BURLEY	5½ „ 8 „ —	6 „ 8½ „ —
VIRGINIA DARK—		
Fillers	5 @ 5½	5¼ @ 5¾
Rather short	6 „ —	6 „ 6¼
Very middling to middling	6½ „ 7½	6½ „ 7½
Good to fine	8 „ 10	8 „ —
VIRGINIA and CAROLINA BRIGHT—		
Semi-dark	6 „ 6½	— „ 8
Semi-bright	7 „ 8½	8½ @ 9 @ —
Medium or mixed ...	9 „ 10½	10 @ 11
Good to fine	11 @ 12 @ 14	11¼ @ 12½ @ 14

LEAF.	1903.	1902.
WESTERN—		
Common export ...	— @ —	— @ —
African export ...	— @ 5 @ 6½	— @ 5 @ 6½
Short trade ...	— @ 4	4 @ —
Medium to good trade	4½ „ 6	4½ „ 6
BURLEY	6 @ 7 @ 8	7 @ 7½ @ 8
VIRGINIA DARK—		
Common export ...	— @ —	— @ —
Short trade	— „ —	— „ —
Medium trade ...	4 „ 5	4 „ 5
Good to fine trade ...	5½ „ —	5½ „ —
VIRGINIA and CAROLINA BRIGHT—		
Common or semi-bright	— „ 6½	6 „ 7½
Medium or mixed ...	7½ „ 10	8½ @ 10 @ —
Good to fine	10½ @ 11½ @ 15	11 „ 12 „ 15

A steady demand has been experienced in this market during May on the reduced scale to which the trade has now become accustomed. The inquiry still runs chiefly on the lower and medium classes both in Westerns and Brights, sales of the better grades being only effected now and again.

Statistics.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE TOTAL RAINFALL FOR EACH MONTH OF THE YEAR IN THE AGRICULTURAL DISTRICTS OF QUEENSLAND.

STATIONS.	1902.						1903.						
	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April.	May.	June.	July.
North.													
Bowen	0·11	0·02	Nil.	0·06	0·06	3·16	1·66	7·65	16·44	1·44	2·04	2·77	0·31
Cairns	3·87	0·95	Nil.	0·16	1·38	5·15	21·32	10·28	32·51	15·50	1·67	0·51	0·87
Geraldton	7·32	1·77	Nil.	0·29	0·44	5·53	38·94	17·24	45·00	14·03	7·48	3·42	2·07
Herberton	2·05	0·08	Nil.	0·93	1·13	7·02	6·88	3·69	20·80	12·04	0·64	1·00	0·19
Hughenden	Nil.	Nil.	Nil.	0·05	0·22	2·77	1·52	0·99	0·95	0·81	1·73	Nil.	0·07
Kamerunga	4·00	0·81	Nil.	0·29	1·57	3·79	20·36	10·82	37·45	19·32	2·14	0·50	1·10
Longreach	Nil.	0·05	Nil.	Nil.	1·27	1·56	1·81	0·09	3·48	Nil.	3·51	Nil.	0·69
Lucinda	0·21	0·45	Nil.	0·22	0·10	2·47	17·43	11·66	44·24	6·44	6·36	2·44	2·38
Mackay	0·59	0·80	Nil.	0·17	0·35	7·71	10·45	6·47	13·51	1·50	6·75	2·49	2·53
Rockhampton	Nil.	0·09	1·41	0·05	0·51	5·60	0·92	1·68	3·73	1·12	6·93	0·08	3·73
Townsville	Nil.	0·10	Nil.	0·29	0·08	6·50	4·66	8·11	19·80	1·61	2·08	1·02	0·05
South.													
Barcaldine	Nil.	0·08	0·02	0·21	0·95	6·41	3·73	0·40	0·94	Nil.	4·92	Nil.	0·90
Beenleigh	0·62	0·49	0·28	2·92	3·36	1·83	1·88	4·77	6·49	1·90	12·40	0·92	5·04
Biggenden	0·08	0·04	1·58	2·34	0·25	8·93	2·25	3·15	3·95	0·16	1·28	2·07	3·90
Blackall	0·01	0·21	0·27	0·12	1·05	4 61	3·04	1·50	3·87	Nil.	5·19	Nil.	1·81
Brisbane	0·55	0·98	1·30	3·42	2·59	1·82	1·31	5·35	4·79	1·33	11·82	0·73	5·56
Bundaberg	0·07	0·13	0·31	1·24	0·65	1·38	0·97	2·60	6·05	0·38	11·55	0·33	5·98
Caboolture	0·20	0·05	1·09	2·30	3·17	1·74	5·15	3·42	9·59	1·39	16·14	0·92	6·08
Charleville	Nil.	1·04	0·30	1·05	2·14	4·79	1·70	0·43	2·94	1·06	2·94	0·02	1·61
Dalby	Nil.	0·41	0·70	3·14	2·79	3·29	1·28	1·22	4·89	1·33	6·00	0·03	3·78
Emerald	Nil.	Nil.	0·02	0·01	1·58	8·42	2·30	2·49	1·48	0·26	3·43	0·02	0·57
Esk	0·25	0·15	0·64	0·93	4·00	7·67	1·32	3·51	4·46	1·25	9·27	0·30	2·97
Gatton College ...	0·04	0·64	0·73	2·41	3·72	5·14	3·68	3·81	2·60	0·79	7·55	0·17	4·15
Gayndah	Nil.	0·05	0·64	2·10	2·08	3·37	0·77	2·08	2·30	0·09	6·03	0·05	2·81
Gindie	Nil.	Nil.	0·10	Nil.	1·65	7·14	1·43	3·15	0·49	0·19	3·31	Nil.	0·51
Goondiwindi	Nil.	1·19	0·21	1·50	0·89	2·21	1·84	0·72	4·40	1·73	5·07	0·15	4·38
Gympie	0·36	0·94	1·38	3·80	1·40	4·32	2·40	3·27	5·96	1·28	10·20	0·62	1·67
Ipswich	0·31	0·77	0·30	2·86	3·45	1·84	1·36	5·55	3·79	2·24	9·56	0·85	3·64
Laidley	Nil.	0·40	0·89	2·21	3·27	5·13	0·71	3·63	2·63	0·95	8·20	0·20	4·65
Maryborough	0·29	0·57	0·69	0·91	1·11	4·02	2·09	2·76	3·23	0·66	9·58	1·60	6·17
Nambour	*	0·70	0·35	1·26	1·66	2·64	2·53	5·03	5·18	0·83	19·46	1·29	5·38
Nerang	1·07	1·22	1·17	3·15	1·75	1·73	3·36	4·73	4·84	3·04	15·75	2·36	7·34
Roma	Nil.	0·46	0·35	0·92	0·86	2·35	0·75	0·15	2·48	0·39	3·17	0·34	2·26
Stanthorpe	0·15	0·94	0·95	2·29	3·98	1·75	0·23	1·59	0·95	1·18	6·87	0·74	4·71
Tambo	Nil.	0·28	0·06	0·41	1·34	4·14	2·43	0·15	4·73	0·02	1·96	0·01	2·64
Taroom	Nil.	0·17	0·45	0·68	1·40	2·88	4·32	1·53	1·29	0·82	8·83	0·23	3·83
Tewantin	0·91	0·85	0·87	1·94	1·96	1·35	1·90	5·30	11·52	1·80	20·22	7·42	7·09
Texas	Nil.	1·57	0·13	2·42	1·67	1·42	0·18	0·94	0·48	1·84	4·34	0·36	4·53
Toowoomba	0·19	0·56	0·37	3·07	3·18	6·99	2·21	3·42	3·60	1·27	7·94	0·34	3·90
Warwick	0·20	0·94	0·43	2·96	2·87	4·61	0·68	2·59	2·13	0·73	8·62	0 10	5·45
Westbrook	0·06	0·29	0·38	3·20	3·34	3·37	4·21	2·70	1·52	0·34	4·23	2·53	3·79

EDGAR L. FOWLES,
For the Hydraulic Engineer.

PRICES IN BRITISH MARKETS OF ARTICLES WHICH CAN BE PRODUCED IN QUEENSLAND.

BUTTER.—Australian, choicest, 92s. to 98s.; second quality, 76s. to 84s.; Danish, 102s. to 104s.; Canadian, 94s. to 96s.; New Zealand, choicest, 96s.; finest, 92s. to 94s. per cwt.

CHEESE.—Canadian, 59s. to 60s.; New Zealand, 66s. to 68s. per cwt.

CONDENSED MILK.—18s. 6d. to 20s. 6d. per case, in 20-case lots.

SUGAR (duties, raw, 2s. to 3s. 10d. per cwt.; refined, 4s. 2d. and ¼ per cent.).—Refined, £15 to £18; raw, £13 to £14 per ton; German beet, 88 per cent., 8s. 2¾d. per cwt.

MOLASSES (duty, 2s. per cwt. and $\frac{1}{4}$ per cent.).—5s. 6d. to 6s. per cwt.

RICE (duty 5d. per lb.).—Rangoon, £9 to £15; Japan, £13 to £17; Java, £20 to £25; Patna, £18 to £22 per ton.

COFFEE (in bond, duty 1½d. per lb. and $\frac{1}{4}$ per cent.).—Ceylon plantation, 40s. to 122s.; peaberry, 60s. to 123s.; Santos, 25s. to 50s.; Mocha, 50s. to 100s.; Jamaica, finest, 90s. to 130s. per cwt.

CHICORY ROOT, dried (duty paid), 26s. to 31s. per cwt.

ARROWROOT.—St. Vincent, 4d. to 5d.; Natal, 7d. to 8d.; Bermuda, 1s. 3d. to 1s. 6d.

WHEAT.—29s. to 35s. 6d. (Old Dantzic) per 496 lb., equal to 3s. 7½d. and 4s. 5¾d. per bushel.

FLOUR.—23s. 6d. to 31s. per 280 lb.

MALTING BARLEY.—English, 28s. to 29s.; Californian, 28s. to 30s. per 448 lb.; grinding, 22s. to 24s. per 416 lb.

OATS.—New Zealand, 26s. to 28s. per 384 lb.; Canadian, 18s. per 320 lb.

SPLIT PEAS.—43s. per 504 lb.

GINGER.—Jamaica, 45s. to 65s.; Cochin, 50s. to 85s.; Japan, 28s. to 30s. per cwt.

VANILLA.—3s. to 7s. per lb.

PEPPER.—Capsicums, 16s. to 80s.; chillies, 30s. to 36s. per cwt.; black, 5¼d.; white, 10d. per lb.

GREEN FRUIT.—Australian, 9s. 6d. to 14s. per case; bananas, 10s. to 13s. per bunch; pineapples, 3s. 6d. to 5s. each; oranges, Valencia, 10s. 6d. to 12s. 6d. for common, to 31s. for finest selected, per 420; lemons, Naples, finest, 22s. to 24s. per 420.

DATES.—Tafilat, 45s. to 50s. per cwt.; Persian, 9s. 6d. to 14s. 6d. per case; Egyptian, 20s. to 35s. per cwt.

COTTON.—5½d. to 6½d. per lb. Queensland cotton from Cairns was valued at 6½d. per lb. at the beginning of the year. Last month 8d. was offered for 6,000 bales.

COTTON SEED.—£6 10s. per ton.

COTTON-SEED OIL CAKE (decorticated).—£6 10s. 6d. to £6 15s. per ton.

COTTON-SEED OIL.—Crude, £20 15s. per ton.

LINSEED.—40s. to 46s. per 416 lb.

LINSEED OIL.—£23 to £23 5s. per ton.

LINSEED OIL CAKE.—£6 12s. 6d. to £6 15s. per ton.

OLIVE OIL.—£50 to £55 per ton (252 gallons).

COPRA (cocoanut-kenel).—£15 15s. to £16 10s. per ton; £8 to £9 per ton at the S. S. Island trading station. Corresponding value in Queensland, £10 to £12 per ton.

COCOANUT OIL.—£25 to £33 10s. per ton.

LUCERNE SEED.—56s. to 60s. per cwt.

MANILLA HEMP.—£25 to £30 per ton.

NEW ZEALAND HEMP.—£33 10s. per ton.

SISAL HEMP.—£35 per ton.

FLAX.—£46 to £52 per ton.

TAPIOCA (duty, 5d. per cwt.).—Pearl, 12s. 6d. to 14s. per cwt.

FROZEN MEAT.—The following are the Frozen Meat Trade Association's Smithfield market quotations for the undermentioned classes of frozen meat, based on actual sales of not less than 100 carcasses of mutton or lamb, or 25 quarters of beef of fair average quality. These quotations are not for selected lines, but for parcels fairly representative of the bulk of the shipments now on the market:—

New Zealand Sheep.

(Crossbred Wethers and Maiden Ewes.)

	Aug 15.	Aug. 22.
Canterbury, light (48 lb. to 56 lb.)	$4\frac{1}{4}$d.	$4\frac{1}{4}$d.
Canterbury, medium (56 lb. to 64 lb.)	$4\frac{1}{4}$d.	$4\frac{1}{4}$d.
Canterbury, heavy (64 lb. to 72 lb.)	$4\frac{1}{8}$d.	$4\frac{1}{8}$d.
Dunedin and Southland (56 lb. to 64 lb.)	$4\frac{1}{8}$d.	$4\frac{1}{8}$d.
North Island (55 lb. to 65 lb.) ...	$4\frac{1}{16}$d.	$4\frac{1}{16}$d.

Australian Sheep.

(Crossbred and Merino Wethers.)

Heavy (over 50 lb.)	None offering.	
Light (under 50 lb.)	None offering.	

River Plate Sheep.

(Crossbred and Merino Wethers.)

Heavy (over 50 lb.)	$3\frac{15}{16}$d.	$3\frac{15}{16}$d.
Light (under 50 lb.)	$3\frac{15}{16}$d.	$3\frac{15}{16}$d.

New Zealand Lambs.

Canterbury, light (28 lb. to 36 lb.)	$5\frac{3}{16}$d.	$5\frac{3}{16}$d.
Canterbury, heavy (36 lb. to 42 lb.)	$5\frac{3}{16}$d.	$5\frac{1}{8}$d.
Dunedin and Southland (28 lb. to 42 lb.)	$5\frac{1}{16}$d.	5d.
North Island (28 lb. to 42 lb.) new season's	$5\frac{1}{16}$d.	5d.

Australian Lambs.

30 lb. to 40 lb.	None offering.	

River Plate Lambs.

30 lb. to 40 lb.	None offering.	

New Zealand Frozen Beef.

Ox, fores (180 lb. to 220 lb.) ...	$2\frac{1}{2}$d.	$2\frac{1}{2}$d.
Ox, hinds (180 lb. to 220 lb.) ...	$4\frac{1}{16}$d.	$4\frac{1}{8}$d.

Australian Frozen Beef.

Ox, fores (160 lb. to 200 lb.) ...	None offering.	
Ox, hinds (160 lb. to 200 lb.) ...	None offering.	

River Plate Frozen Beef.

Ox, fores (160 lb. to 220 lb.) ...	$2\frac{7}{16}$d.	$2\frac{7}{16}$d.
Ox, hinds (160 lb. to 220 lb.) ...	$4\frac{1}{16}$d.	$4\frac{1}{16}$d.

(All quotations for beef are nominal.)

EGGS.—French, 10s. to 30s. 3d.; Danish, 6s. 6d. to 8s. 6d. per 120.

BACON.—Irish, 58s. to 65s.; American, 50s. to 54s.; Canadian, 55s. to 57s. per cwt.

HAMS.—Irish, 74s. to 98s.; American, 53s. to 62s. per cwt.

TALLOW.—Mutton, fine, 29s. 9d.; medium, 28s. per cwt.; beef, fine, 30s.; medium, 28s. per cwt.

Agricultural Patents.

PATENTS ACCEPTED.

7020: Alfred John Brownscombe, of Nalinga, Bective, New South Wales, Australia, agriculturist. "Improved Comb Cleaning Attachments for Strippers or Harvesting Machines." Dated 15th December, 1902.

7080: Edward Garland Abel, of 159 Queen street, Brisbane, Queensland, Australia, patent agent. "Improvements in Appliances for Cutting Sugar-cane, Maize, Sorghum, and other like Crops." Dated 22nd January, 1903.

7113: Frederick Augustus Brand, of Benicia, county of Solano, California, U.S.A., vice-president of the Benicia Agricultural Works of Benicia, California, U.S.A. "Disk Plow." Dated 10th February, 1903.

7342: Professor Dr. Rudolf Emmerich, of 22 Pettenkofer Strasse, Munich' Germany. "Improvements in and relating to the Preservation of Meat." Dated 25th June, 1903.

Times of Sunrise and Sunset, 1903.

Date.	September.		October.		November.		December.	
	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1 ...	6·6	5·31	5·31	5·45	5·1	6·3	4·50	6·24
2 ...	6·5	5·32	5·30	5·46	5·0	6·4	4·50	6·24
3 ...	6·4	5·33	5·29	5·47	4·59	6·5	4·50	6·25
4 ...	6·2	5·33	5·28	5·47	4·59	6·5	4·51	6·25
5 ...	6·1	5·33	5·27	5·47	4·58	6·6	4·51	6·26
6 ...	6·0	5·34	5·26	5·48	4·58	6·6	4·51	6·27
7 ...	5·59	5·35	5·24	5·48	4·57	6·6	4·51	6·28
8 ...	5·58	5·35	5·23	5·49	4·57	6·7	4·51	6·29
9 ...	5·57	5·35	5·22	5·49	4·57	6·7	4·51	6·30
10 ...	5·56	5·36	5·22	5·50	4·56	6·8	4·51	6·31
11 ...	5·55	5·37	5·21	5·50	4·55	6·9	4·51	6·32
12 ...	5·53	5·37	5·21	5·50	4·55	6·9	4·51	6·32
13 ...	5·52	5·38	5·20	5·50	4·53	6·10	4·51	6·33
14 ...	5·51	5·38	5·19	5·50	4·53	6·10	4·51	6·33
15 ...	5·50	5·38	5·18	5·50	4·53	6·12	4·52	6·34
16 ...	5·48	5·38	5·17	5·52	4·53	6·13	4·52	6·34
17 ...	5·47	5·39	5·16	5·52	4·52	6·14	4·53	6·35
18 ...	5·46	5·40	5·15	5·52	4·51	6·15	4·53	6·35
19 ...	5·45	5·40	5·13	5·52	4·50	6·16	4·54	6·36
20 ...	5·44	5·40	5·13	5·53	4·50	6·17	4·54	6·37
21 ...	5·43	5·41	5·12	5·55	4·50	6·18	4·54	6·38
22 ...	5·42	5·42	5·11	5·56	4·50	6·18	4·54	6·38
23 ...	5·41	5·43	5·10	5·57	4·50	6·19	4·55	6·39
24 ...	5·40	5·43	5·9	5·57	4·50	6·20	4·55	6·39
25 ...	5·39	5·43	5·7	5·57	4·49	6·21	4·56	6·40
26 ...	5·37	5·43	5·6	5·58	4·49	6·21	4·57	6·41
27 ...	5·36	5·44	5·5	5·59	4·49	6·21	4·57	6·41
28 ...	5·35	5·45	5·4	6·0	4·49	6·21	4·57	6·41
29 ...	5·34	5·45	5·4	6·1	4·49	6·22	4·58	6·41
30 ...	5·33	5·45	5·3	6·1	4·49	6·23	4·59	6·41
31 ...	...	...	5·2	6·1	...	...	4·59	6·41

Phases of the Moon.

		H.	M.
6 Sept.	○ Full Moon	12	19
14 „	☾ Last Quarter	1	13
20 „	● New Moon	16	39
28 „	☽ First Quarter	1	8
6 Oct.	○ Full Moon	3	23
13 „	☾ Last Quarter	7	56
20 „	● New Moon	3	30
27 „	☽ First Quarter	20	32
4 Nov.	○ Full Moon	17	27
11 „	☾ Last Quarter	14	45
18 „	● New Moon	17	10
26 „	☽ First Quarter	17	36
4 Dec.	○ Full Moon	6	12
10 „	☾ Last Quarter	22	53
18 „	● New Moon	9	25
26 „	☽ First Quarter	14	22

General Notes.

BOERS IN JAVA.

The Governor of German South-west Africa openly states that the Boer colonists in Java are only useful for cattle-breeding operations, and that, if they had no capital, they simply travelled about with their families, subsisting on what they could shoot, and doing damage to the wells, the pastures, and the timber. The Boers, he said, never worked as artisans or labourers.

If this be so, then Boer colonists would have a hard time in Queensland, where there is nothing to shoot but paddamelons, wallabies, emus, rabbits, and dingoes.

POISON IN PRESERVED AND SALTED MEATS.

A butcher lately stated that the so-called ptomaine poisoning was really the result of not properly cleaning the apparatus used for pumping brine into meat. Verdigris forms on the copper portions of it, and this taints the meat. Verdigris in preserved meats is easily detected, quite as easily as in a pure solution of any copper salt. All that is needed for the test is to dip a steel knife into the tin or leave it for a minute or so in the salt beef. If verdigris or copper of any kind is present, the blade turns red. If it becomes black the meat is wholesome.

BURNS.

Burning accidents are so frequent in this country of open fires, that it is surprising people will not take the trouble to acquaint themselves with the proper remedies in the case of burns which are not severe enough to be fatal. As soon as any portion of the body is burnt, apply a compress moistened with 1 part of picric acid to 100 parts of water. This will soon alleviate the pain, and the part will not blister. Anyone who has lifted a billy from the fire by the red hot handle will appreciate this simple remedy.

A PROFITABLE POTATO.

Twenty-three tons of potatoes per acre would seem to be an improbable crop. If any Queensland farmer raised eight tons per acre he considers he has done well; but in England, or rather Wales, the above enormous crop has been produced by the help of a new variety of potato, called Sir John Llewellyn. This is what the *Mark Lane Express* says about it:—

Messrs. Horne and Sons, of Cliffe, Rochester, Kent, are to be congratulated on their potato, Sir John Llewellyn, which has just been imported into Ireland for raising for the Dublin market. In commenting on this the *Irish Farmers' Gazette* mentions that the potato was sent to the Royal Horticultural Trial Grounds at Chiswick, in 1900, to compete with forty-two other varieties that were to be tested, some new and some well-known varieties, such as Sutton's Ashleaf, Myatt's Ashleaf, Beauty of Hebron, Ninetyfold, etc. The whole of the forty-two varieties were planted on April 19th; all made excellent growth, and with two exceptions all produced good crops free from disease. On September 11th the committee were present to judge the trial, and the official report was as follows:—"Sir John Llewellyn, kidney, white, eyes shallow, handsome; the heaviest crop in the collection, free from disease, haulm tall and robust; award of merit."

The same year the raiser of this new variety grew at Swansea, South Wales, the remarkable crop of twenty-three tons to the acre of sound tuber. This was a record in itself. Messrs. Horne and Sons distributed this variety in 1901 at £40 a ton. In 1902, although there were as many more produced, they realised £40 a ton, while in January, 1903, they made the same figure.

A NEW APPLE.

An excellent apple, which may fairly be described as a "General Purpose Apple," has been raised in England by a grower, who has received an award of merit from the Royal Horticultural Society. We are not informed whence the grower introduced it, but it is described as a cross between Blenheim Orange and Golden Noble. It may be used for dessert, but it is chiefly valuable as a late cooking variety. It is a great and regular bearer, upright grower, short-jointed, late bloomer; fruit, solid, heavy, about the size of a Blenheim Orange. It is pronounced to be certainly one of the late apples of the future.

NEW METHOD OF PRESERVING VEGETABLES.

At Long Island, near New York, a new industry is, we learn from American journals, being profitably worked; and one which promises to add largely to the consumption of vegetables. This consists in the abstraction of the moisture from fresh vegetables, leaving the latter perfectly desiccated, yet retaining the full flavour of the fresh vegetable. The apparatus required appears to be very simple, consisting of a machine by which dry, hot air is passed rapidly over the vegetables, extracting and absorbing all the moisture, yet not cooking the products. By this process green corn, onions, carrots, pumpkins—any vegetable, in fact, may be prepared and kept for months ready for use. When the vegetables are desiccated, they are put up (in the case of vegetables for soups) in quarter-pound boxes, which sell for 10 cents (5d.). Before cooking the vegetables should be soaked in water for one or two hours. They then absorb water, and regain something of their original texture and and volume. Plants for carrying on the industry are to be erected in different sections of the country where vegetables are largely grown.

QUEENSLAND BANANAS IN CEYLON.

Some time ago a consignment of banana plants was sent to the Government Stock Garden, Colombo, by the Department of Agriculture. Three of the eight plants sent, we understand, are now in bearing. These three are named Borego, Ladies' Fingers, and Cavendish. The only one which had ripened at the time of writing, says the *Agricultural Magazine*, was the Borego. The fruit of this variety is of moderate size, with a thin skin and a yellowish, mealy pulp of good flavour. Plants of all eight varieties (which have thrown up suckers freely) have been sent out to school gardens in various parts of the Island.

SORGHUM POISONING.

An American farmer, writing to *Home and Farm* says on this subject:—I have heard many complaints of sorghum killing cattle, yet I have never lost any, but others around me have, and I think the reason is they pasture in July and August. At this stage of sorghum it is suckering, and a kind of glue forms around the sucker or where it has been cut off, and by close examination you will find a little red insect which will undoubtedly kill cattle. This insect is found only in the hot part of summer. After cool nights in September you can pasture all you want without danger.

NEW SEEDLING CANE.

A new seedling sugar-cane, says the *Agricultural News* of Barbados, raised by Mr. C. K. Gibbons, of Collynns plantation, Barbados, appears to be very promising. It is stated to have yielded at the rate of 42 tons of cane per acre. The yield of saccharose per gallon of juice is 2·106 lb. The quotient of purity is exceptionally high, viz., 91·13. On the other hand. the glucose ratio is very low, viz., 1·99. Mr. Gibbons adds that "the cane possesses a very hard rind and parts readily with its dry leaves." Top plants are offered by Mr. Gibbons at the rate of 25 cents. per hundred.

JAVA PLANTERS' TROUBLES.

Planting Opinion says that in East Java planters and producers have fallen upon evil times. Over-planting has done such harm on several sugar estates that they are expected to shut down. The same fate is likely to befall many coffee estates which unremunerative prices have brought low. Growers of pepper, cocoa, tree-cotton, and castor oil are hardly any better off. The general opinion is that total ruin is hanging over coffee-planters there.

ROSELLAS FROM CUTTINGS.

Mr. Charles Kuchs, of Gatton, has been experimenting with rosella plants. As he only had a few, and wanted more, he cut off some of the lower branches of the growing bushes and planted them. They struck root, grew well, and produced a crop equal in quantity and quality to those grown from seed.

When a farmer thinks he has discovered something that everybody does not know, he should imitate Mr. Kuchs' example, and get the *Journal* to spread the news. We never heard of growing rosellas from cuttings before, and probably not one grower in fifty knows that it can be done.

HOME-GROWN PORRIDGE MEAL.

E. G. R., writing from Westwood, Buderim, sends us the following method of utilising pearl millet, which appears to be successful:—

One day I was passing our pearl millet patch, and the thought came to me to try it as a porridge meal. As soon as it was ripe we did so, and all pronounced it a success. Pearl millet is easily grown, and we thought that perhaps through the pages of the *Queensland Agricultural Journal* others might hear and profit by the experiment.

NATIVE WILD BEAN.

We have lately received several specimens of a bean which grows wild in many coastal districts, and inquiries have been made as to whether it is edible, and could be used for feeding stock, especially pigs. We have referred the matter to the Colonial Botanist, Mr. F. M. Bailey, and he is of the opinion that it *may* be injurious. Still, he hesitates to give a decided answer for the reason that although no mention is made of any poisonous property in this particular variety of the edible sword-bean by numerous writers, the late Baron von Mueller, Government Botanist of Victoria, in his work on "Select Extra-tropical Plants," states that it is "decidedly deleterious." On the other hand, Trimen in his "Flora of Ceylon," recently published, states that "the seeds are much eaten, boiled, at Batticaloa and elsewhere." Where eminent authorities differ so diametrically on this point, it is not possible for us to decide as to whether it is poisonous or not. *Fiat experimentia—i.e.*, let an experiment be made on some worthless animal, say, a pig. If fed mainly on the bean diet the question would quickly be settled. The name of the bean is *Canavalia obtusis.*

SALTING COWS AND PIGS.

If salt be sprinkled on the backs of cows it will make them more gentle and friendly. In the case of pigs, it has the effect of keeping off lice and mange.

SWINE FEVER IN VICTORIA.

Owing to the outbreak of swine fever in Victoria seven districts have been placed in quarantine. Had the matter of suppressing the disease been taken in hand as promptly as was done in Queensland by the Stock Department it would have been stamped out at very small cost. Now it is said that it will cost the Southern State £180,000 to do so, whereas the total cost in Queensland was under £130, the disease being completely eradicated.

Answers to Correspondents.

WARTS ON COWS' TEATS—ENLARGING OPENINGS OF TEATS.

MILKMAN, Kooroongarra.—

1. Castor oil rubbed on to the teats has often proved successful in removing warts. Make a mixture of castor oil and salt, and apply every two days till the warts disappear.
2. There is an instrument made for the purpose of enlarging the ducts in the teats. After entering, it is withdrawn, making a slight cut in the whole length of the opening. The cut quickly heals, and the milk is then obtained freely.

CUZCO MAIZE—MILK TESTER.

H. J. THORNE, Coolabunia.—

1. The Department has at present no cuzco maize seed. Some was received and sent out for trial, but owing to the drought it proved a failure.

2. Cost of a Babcock milk tester—6-bottle, £3 10s.; 4-bottle, £2; 2-bottle, £1 10s.

3. Material required—Tin, iron disc, wooden frame. We cannot give quantities, but would advise you to purchase rather than manufacture one.

MOTHS DESTROYING CABBAGES.

WM. ARCHBOLD, Toowoomba.—With regard to the injuries to the cabbage occurring as gnawings in the leaf-tissue so affected that the epidermis opposite the point of attack is left in its entirety brought under notice by a Toowoomba resident, it is evident that these have been caused by some moth-caterpillar, but not by the larva of the Diamond Black Moth (*Plutella cruciferatum*) the most common of the depredators of its class.

There are several different kinds of caterpillars that feed upon the members of the cabbage tribe in Queensland, but the only one known to the writer that occasions damage similar to that displayed, is a smooth robust banded insect, that attains a length of about 1 inch, and which is the young of a noctuid moth, originally named by the entomologist, F. Walker, *Spodoptera umbraticula*, but apparently referable to the genus *Euplexia*. This insect, that has a wing-expansion of about 1 inch, also has the front wings mottled with very dark-brown grey and creamy-white and the hind ones glistening white with the apex and vens fuscous-coloured. In life it flies with rapid dart-like motion, and when settled takes a narrow triangular form, the hinder being covered by the anterior wings.

To destroy these caterpillars the remedy for leaf-eating insects generally, Paris green, applied as for others of this class of insects, and with the usual precautions, may be employed. It will also succumb to the application of Stockholm tar and soda wash. The latter kills it by contact, whilst at the same time its characteristic odour prevades the foliage on which it is sprayed, to such an extent as to deter many insects bent on laying their eggs on the leaves of the cabbage, from effecting this purpose.

These insecticides—*the Paris green especially*—should not be used subsequently to the commencement of heading by the plants, but they can scarcely be applied too soon on its being set out in its permanent station. In fact, for cabbages threatened with the attacks of leaf-eating insects and aphis it is especially recommended that the above-ground parts be immersed in soap solution, with preferably the addition of tobacco infusion, prior to this procedure being carried out.

MIXING MANURES—ANALYSIS OF URINE.

FARMER, Toowoomba.—

1. Nitrate of soda may be safely mixed with meatworks manure.
2. Analysis of urine—per cent.

	Cattle.	Horse.	Pig.	Human.
Water	93·8	90.1	96·7	96 3
Organic matter ...	3·5	7·1	2·8	2·4
Ash	2·7	2·8	1·4	1·5
Nitrogen	·6	1·6	·4	·6
Potash	·5	1·5	·8	·2
Lime	·01	·5	—	·02
Phosphoric acid ...	—	—	·07	·2

CHEAP COVERING FOR A STACK—FROST-RESISTING SUGAR-CANE.

I. N., Coolabunia.—

1. The best covering for a stack, unless thatched, is that described in this *Journal*, in Vol. IX., p. 561. Purchase two rolls of four-ply building paper, each roll 336 feet long, by 3 feet wide, at 38s. per roll. Cut the two rolls into sixteen pieces, 42 feet long. Mark a line, with white paint, at right angles across the middle of each piece, at 21 feet from the end; finish off the ends with a 3 feet piece of hardwood batten on each side, screwed or nailed together with the ends of the paper between; bore a half-inch hole through the batten at 3 inches from the ends, into each of which fix a wire loop, 6 or 8 inches long; then roll each piece up from each end, to the white line, and put a tie round it. Then sixteen pieces will cover a stack measuring 44 feet by 24 feet. The stack can be built to any height, with the ends carried up perpendicularly, and the sides of the top shaped to a roof. Now pass the rolls up to a man on top, who will lay the white line straight with the ridge, and let the battened ends fall on each side. Allow a 3-inch lap, and put on each piece in the same way. Then drive pointed stack spars through the wire loops into the stack. If this is well done, the stack will be wind and water tight, and, when required, only 3 feet need be uncovered at once. This building-paper stack cover will last for years. The paper can be procured in Brisbane from Messrs. E. Rich and Co.

2. There is no variety of frost-proof sugar-cane, that we know of.

CORN TASSEL BEARING—CROSSING MAIZE WITH SORGHUM.

R. E. GARDINER, Townsville.—

1. The specimen of maize you send, showing ripe grain on the flower (not the tassel) of the maize plant is nothing new. It is of very common occurence, especially in the case of the maize imported from the Argentine. Although the male flowers are at the top of the stalk, and the female on the tassel above the cob, it constantly occurs that female flowers and male are mixed, with the result that bare grain forms on the flower head, and often merely a core and no grain on the cob. If the flower head consisted entirely of female flowers, there would be no cob.

2. We have not heard of any attempt having been made to produce a hybrid from crossing maize and sorghum. The distance between the two is so great that it is highly improbable that the attempt would be successful. Sorghum is more closely allied to the sugar-cane, but even in this case, success would be highly problematical.

BEE-KEEPERS' REQUISITES.

A.M.C., Wooroolin.—Write to Mr. H. R. Stephens, Busy Bee Apiary, Toowoomba, or to Mr. J. Cribb, Milton Apiary, Brisbane, for all particulars.

The Markets.

TOP PRICES FOR FRUIT—ROMA-STREET MARKETS.

Article.	JUNE. Top Prices.	JULY. Top Prices.
Apples, Eating, per case	9s.	10s.
Apples, Cooking ,,	8s. 6d.	8s 6d.
Apples, American, Eating, per case	...	...
Apples, American, Green ,,	...	...
Lemons, Italian, per 360	...	15s.
Lemons, Italian, per 180	10s. 6d.	7s. 6d.
Lemons, American, per 180	...	...
Lemons, New South Wales, per case	6s. 6d.	6s.
Oranges, Italian ,,	...	...
Oranges, Local ,,	4s.	4s. 6d.
Oranges, Sydney, (packers) ,,	3s. 6d.	...
Mandarins, Local ,,	10s.	9s.
Mandarins, Sydney (packer) ,,	6s.	...
Apricots, New South Wales, boxes (half-gincase)	...	...
Apricots, Queensland, half-case	...	...
Plums, half-gincase	...	...
Peaches, half-gincase	...	...
Nectarines, half-gincase	...	...
Gooseberries, English	...	...
Cherries	...	...
Passion Fruit, quarter-case	4s.	4s.
Mangoes	...	...
Pineapples, rough, per dozen	1s. 6d.	2s. 3d.
Pineapples, Queen ,,	3s. 6d.	4s.
Melons	...	...
Rockmelons	...	...
Bananas (local), per bunch	1s. 3d.	1s. 3d.
Bananas (Northern), per dozen	2½d.	2½d.
Tomatoes, quarter-case	1s. 6d.	2s. 6d.
Pawpaw Apples, case	3s.	...
Custard Apples, quarter-case	7s.	7s.
Granadillas, case	4s.	...
Seville Oranges, apple-case	4s.	4s.
Cape Gooseberries, quart	6d.	5d.
Cumquats (quarter-case)	...	2s.
Peanuts, per lb.	2½d. to 3d.	4d.
Pears (Melbourne), export case	10s.	...
Pears (Tasmanian), quarter-case	7s. 6d.	...
Rosellas, per sugar-bag	1s.	...

AVERAGE TOP PRICES FOR JUNE AND JULY.

Article.		JUNE. Top Prices. £	s.	d.	JULY. Top Prices. £	s.	d.
Bacon	lb.	0	0	$8\frac{7}{8}$	0	0	8
Bran	ton	5	0	0	4	1	3
Butter, First	lb.	0	1	$0\frac{1}{4}$	0	1	$1\frac{1}{16}$
Butter, Second	,,	0	0	$9\frac{7}{8}$	0	0	$9\frac{1}{2}$
Chaff, Mixed	ton	4	13	9	4	0	0

AVERAGE TOP PRICES FOR JUNE AND JULY—*continued.*

Article.		JUNE. Top Prices.	JULY. Top Prices.
		£ s. d.	£ s. d.
Chaff, Oaten	ton	6 10 0	5 16 3
Chaff, Lucerne	"	4 15 0	4 0 0
Chaff, Wheaten	"	5 10 0	5 10 0
Cheese	lb.	0 0 $7\frac{7}{8}$	0 0 $7\frac{1}{2}$
Flour	ton	12 7 6	12 5 0
Hay, Oaten (Imported)	"	7 0 0	7 0 0
Hay, Lucerne	"	3 6 3	2 5 0
Honey	lb.	0 0 3	0 0 3
Rice, Japan (Duty paid)	ton	22 16 3	23 0 0
Maize	bush.	0 3 $6\frac{3}{4}$	0 3 5
Oats	"	0 3 $11\frac{1}{2}$	0 4 0
Pollard	ton	6 1 3	5 0 0
Potatoes	"	4 17 6	5 2 6
Potatoes, Sweet	"	1 16 3	1 10 0
Pumpkins	"	1 17 6	1 11 3
Sugar, White	"	21 5 0	21 10 0
Sugar, Yellow	"	18 5 0	18 0 0
Sugar, Ration	"	14 15 0	14 10 0
Wheat	bush.	0 5 9	0 5 9
Onions	cwt.	0 4 3	0 4 $8\frac{1}{4}$
Hams	lb.	...	...
Eggs	doz.	0 1 $5\frac{1}{4}$	0 1 $1\frac{1}{4}$
Fowls	pair	0 4 3	0 4 $5\frac{1}{4}$
Geese	"	0 5 10	...
Ducks, English	"	0 4 $7\frac{1}{2}$	0 5 $1\frac{1}{2}$
Ducks, Muscovy	"	0 5 6	0 5 $9\frac{3}{4}$
Turkeys, Hens	"	0 9 0	0 8 $9\frac{3}{4}$
Turkeys, Gobblers	"	0 17 $2\frac{1}{4}$	0 18 $2\frac{1}{4}$

ENOGGERA SALES.

Article.	JUNE. Top Prices.	JULY. Top Prices.
	£ s. d.	£ s. d.
Bullocks	10 0 $7\frac{1}{2}$	10 6 $7\frac{1}{2}$
Cows	7 1 3	7 2 6
Wethers, Merino	0 19 $7\frac{1}{2}$	1 3 $10\frac{1}{2}$
Ewes, Merino	0 14 3	0 18 $7\frac{1}{2}$
Wethers, C.B.	1 0 9	0 19 $10\frac{1}{2}$
Ewes, C.B.	1 0 $7\frac{1}{2}$	0 19 6
Lambs	0 15 10	0 16 $7\frac{1}{2}$
Pigs	...	...

Orchard Notes for September.

BY ALBERT H. BENSON.

The planting and pruning of all deciduous trees should have been completed even in the coldest districts by the end of August, and during the present month the orchardist should disbud and thumb-prune the young trees as soon as they start out into growth. Judicious thumb-pruning is necessary in order to reduce the number of branches, only those buds being allowed to develop into branches that will be required to form the future head of the tree, all the rest being either removed or, better still, pinched back and converted into spurs which will eventually bear fruit, and which, meanwhile, will produce a tuft of leaves that will tend to strengthen the branch and to protect it from sunburn. Spraying should be continued during the month in the case of deciduous trees attacked by fungus diseases, such as the shot-hole fungus or rust of the apricot and the Windsor pear blight of pears, the material used being Bordeaux mixture. Where leaf-eating insects of any kind are troublesome, a little Paris green—1 oz. to 10 gallons—should be added to the Bordeaux mixture, the spraying material being then both an insecticide and fungicide, and two pests are destroyed by the one spraying. Vines that have not been treated for black spot, as described in the Orchard Notes for August, should be treated at once; and vine-planting should be done during the beginning of the month, though if the cuttings have been kept in a cold place planting can be continued all through the month. In planting grape-cuttings, see that the cutting is always planted firmly, and that the soil comes into direct touch with it all round, as, if not, it is very apt to dry out. Plant the cutting with the top eye just on a level with, or rather slightly below, the surface of the ground, not with 6 inches or more of the cutting sticking out of the ground, as the nearer to the ground the main stem of the vine starts the better the vine will be, and the easier will be its subsequent training.

Orange-trees will be in full blossom during the month, and in the earlier districts the young fruit will probably be ready to treat for Maori or rust towards the end of the month. Maori is caused by a very small mite, which begins its attack on the young fruit when it is about the size of a marble, though the injury it causes is seldom noticeable till the fruit begins to ripen. Spraying the trees with a mixture of sulphur and soft soap or with a weak solution of sulphide of soda, or dusting the trees with fine sulphur, will destroy these mites. During the end of the month pineapple and banana suckers may be set out during favourable weather in the earlier districts, but it is not advisable to plant out too early, as they do not root readily till the soil is thoroughly well warmed. Orchards and vineyards should be kept well cultivated during the month, as if there is a dry spring the success of the crop will depend very much on the manner in which the orchard is kept, as the better the orchard is cultivated the longer it will retain the moisture required by the trees for the proper development of their fruit. Quickly-acting manures, such as sulphate of potash, sulphate of ammonia, and superphosphate, can be applied to fruit trees during the month if there is any suitable showery weather, but should not be applied during either a very dry or a very wet spell. Fruit trees should be mulched, and when cow peas are required for mulching they can be planted towards the end of the month.

During the month a careful examination should be made of all fruit to see if any contains larvæ of fruit fly; and if such are found they should be destroyed, as if extreme care is taken during this and the two following months to destroy the larvæ of all fruit flies, whenever and wherever found, this great curse of the fruitgrower would be greatly reduced, as it is on the careful destruction of the earlier broods of flies that the saving of the main crop of fruit will principally depend. Though the first damage caused by the flies is comparatively insignificant, they reproduce themselves so rapidly that a few mature insects in the beginning of the season become many thousands before itcloses.

Farm and Garden Notes for October.

FARM.—We are now in the second month of autumn, and may reasonably look for warmer weather and grateful showers of rain. The weeds will be on the increase, and the labour of the farmer and gardener will be increased likewise to cope with them. Hence the horse-hoe, hand-hoe, and cultivator will have to be set diligently to work. Whatever you may have to leave undone, do not let the weeds get ahead of you. If you neglect to destroy them, and allow them to go to seed, it means the seven years' weeding for one year's seeding. Earth up growing crops which require it, and keep the ground loose amongst them. Plant sweet potatoes, yams, earthnuts, arrowroot, turmeric, ginger. Sow and plant out tobacco. Sow maize, sorgham, setaria, imphee, Kafir corn, *Paspalum dilatatum.*

KITCHEN GARDEN.—Keep all crops clean; mulch and water when necessary. Cabbages may be planted out, taking care to destroy the aphis by spraying or dusting with tobacco dust as soon as the pest appears. French or kidney beans can now be sown in all parts of the State. Lima beans are a first-class hot-weather vegetable. The hotter the weather, the better the Lima bean likes it. Sow the dwarf kinds in drills 3 feet apart and 18 inches between the plants; the climbing kinds must be sown 6 feet apart each way. Beetroot may still be sown. If cucumbers, melons, squashes, and marrows have not yet been sown, get them in at once, or you will lose the best of the season for these vegetables and fruits. Leaf-eating beetles will probably attack them, but a spray of Paris green or London purple will effectively suppress them. Many gardeners like to grow chillies. Now is the time to sow them. They generally grow here like weeds; but if you have any particular kind sow them in boxes or in a seed bed, and plant out when large enough. You should sow the bird's-eye pepper, which is not much larger than a large grain of wheat, and is very valuable to pickle-makers. It is the hottest of all the chillie family. West Indian gherkins, if you can get the seed, may be sown largely. They meet with a very ready sale for pickle-making. Set out egg plants in rows 4 feet apart. In the cool districts sow a few rows of peas, but in the hotter parts of the State it is a waste of time and money to try and raise peas. Plant out tomatoes at once, 3½ feet each way. Train them on trellises, breaking off the shoots which spring from the junction of the leaf with the main stem. Set out rosellas. Besides the fruit, the plant produces an excellent fibre, which can be utilised for tying up plants to stakes and trellises. A very nice wine may be made from the fruit, which is also excellent for pies, puddings, and jam. The fruit may also be dried and stored for winter use. Weeds will be very troublesome now, but it is imperative to keep them down. If you have to water, do it early in the morning or late in the afternoon. Should the soil appear baked next day, stir it with the hoe. A fine soft tilth is of the greatest advantage in the vegetable garden. All plants also are benefited by mulching during hot weather.

FLOWER GARDEN.—If you have followed out the directions given for the management of the flower garden during the past three months, you will now be rewarded with bloom of many varieties; especially should the roses be in full bloom. It is a good time to plant out palms and all kinds of tropical and semi-tropical plants, being careful to give them ample water and shade. Plant chrysanthemums, giving them plenty of water daily. Look out for pests, especially aphis and caterpillar, and spray the plants freely if they appear. Sow dianthus, snapdragon. Plant coleus in the borders. Keep the borders well hoed and the grass edgings trimmed, and keep the lawn mower going on the grass. Do all the planting as much as possible in dull showery weather.

IN TROPICAL QUEENSLAND

continue the planting of bananas. Sow paddy; plant yams, turmeric, sugar-cane, and coffee. Wherever manure is needed, apply stable, cowyard, or meatworks manure. Stake any yams which have begun to climb. Trim olive-trees. Plant out sisal hemp suckers. Keep the coffee plantation clean. In some seasons coffee-trees will bloom during this month. A small picking of Liberian coffee may be made. It is not wise to sow coffee seed now which was picked in the earlier months of the year, germination being doubtful. Sugar-cane crushing will be continued.

Agriculture.

STACK ENSILAGE.

We take the following useful information about stack ensilage from a Bulletin of the Council of Agriculture, Tasmania, by Mr. A. Conlon, Government Dairy Instructor.

Mr. Conlon says:—The Tasmanian dairy farmer is certainly slow to recognise the merits of ensilage, in spite of the fact that this system of conserving fodder is now far beyond the experimental stage. From my intercourse with farmers, I have concluded that the principal reasons for their reluctance to move in the matter are that the methods as generally given in the various agricultural journals are too elaborate and costly; and that farmers, speaking generally, prefer to watch the results of experiments made by others; in fact, they prefer a practical lead to a theoretical lesson.

I felt the need of formulating some simple and inexpensive system of ensilage, and of illustrating the same by means of lantern-slides when lecturing; and I was fortunate in securing the collaboration of Mr. Chas. Grueber, of Moonah, near Hobart. With his assistance, I have been enabled to secure slides illustrating the very simple operations necessary to ensure success in the making of stack ensilage. Mr. Grueber ensiles a crop every year on this system, and with invariable success.

Advantages of the Stack System.

The stack system was chosen for illustration purposes as being by far the cheapest method to follow, notwithstanding the slight loss which must invariably occur at the outer edges; and it will be understood that I do not advocate the stack system as being superior to built silos or pits, but only from an economical standpoint, as (under this system) no expenditure is incurred in the erection of silos, which are all more or less costly. Again, a stack may be erected in the paddock where the crop is grown. By this a great saving in cartage can be secured, whereas with the built silo or pit all fodder intended for silage must be carried thereto, no matter how distant the crop. It is also easier to make sweet silage in stack form than by the use of rigid silos; and a stack has unlimited capacity—that is, it can be made of any size suitable to the quantity of fodder grown. There is also less waste in the larger stacks, owing to the fact that the larger the stack the less the exposed surface in proportion to the mass.

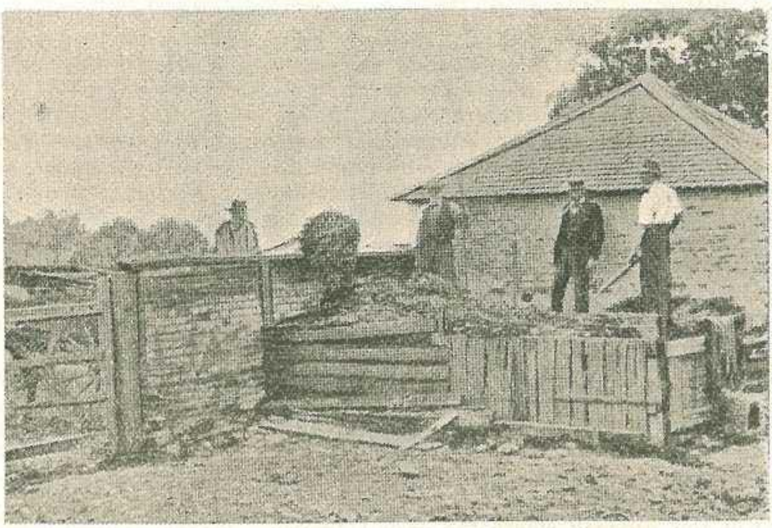
The Influence of Temperature.

There are two kinds of silage—sweet and sour. It is with the former that we are concerned in the present article, as being the most suitable to make under the stack system. It is in controlling the result, or, in other words, in the production of sweet or sour at will, that the whole art of ensilage exists. This result depends chiefly upon the temperature which the mass has been allowed to reach, and the amount of pressure applied.

If, after carting the green material, heavy pressure is at once applied, the air is excluded, and the temperature of the mass is consequently kept at a low level. When by this means the temperature is prevented from rising above 120 degrees Fahr., sour silage results. On the other hand, for the production of sweet silage, the mass must not be weighted to any great extent before the temperature has reached from 130 degrees Fahr. to 150 degrees Fahr. Care must be taken not to allow the temperature to rise above 160 degrees Fahr., or the stack will become overheated and burnt. The intelligent use of the thermometer is the chief factor in successful ensilage-making; and to the neglect of these few simple details the many failures may be attributed. An ordinary floating dairy thermometer is the most convenient type to use, an iron pipe of slightly larger diameter being built into the middle of the stack in a vertical position. The thermometer may then at any time be lowered by a string, and the temperature taken at any required depth.

HOW TO BUILD THE STACK.

Having selected a convenient and perfectly level site, a thick layer of straw should be laid down as a foundation, the size and shape being governed by estimating that, for every 3 tons of hay the crop would have produced, about 10 tons of silage may be reckoned on. Having arrived at an approximate estimate of the weight, the base measurements should be somewhat as follow :—For 15 tons, 9 feet by 9 feet; 20 tons, 10 feet by 10 feet; 50 tons, 13 feet by 13 feet; 100 tons, 16 feet by 16 feet.



Only as much of the crop as can be carted and stacked in one day should be cut; a day or two should then elapse before adding more material. This allows the temperature to rise, and also the mass to subside, which facilitates the work of stacking. In an ordinary haystack the sides are built projecting outwards—this must be carefully avoided in building silage stacks. It is far better to have the sides and ends inclining inwards; there is then less tendency for the stack to lean over, which frequently happens, owing to the fermentation causing unequal settling of the mass. Should this occur, props must be set—at a wide angle—to the leaning side, when, on further subsidence taking place, the pressure brought to bear will bring the stack back to the perpendicular.

From the first load to the completion of the stack the greatest attention should be paid to the outside edges. This is a very important point. The outsides should always be kept higher than the centre when stacking, and should be made much more compact by being well trodden down, the centre being left comparatively loose.

When finished, the top should be levelled, and covered with a layer of straw, pressure being then applied by piling the handiest material procurable on the top, so that a dead weight of about 1 cwt. per square foot is secured.

MR. GRUEBER'S SILAGE.

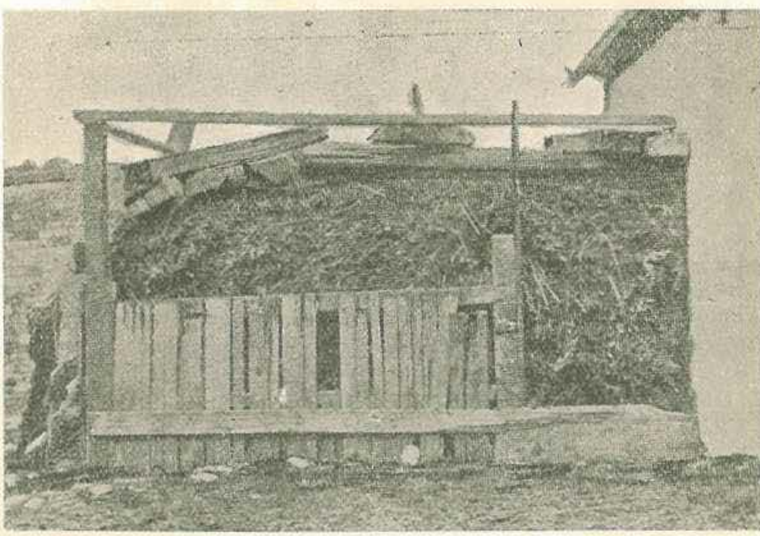
Any succulent growth, so long as it contains nothing deleterious to stock, may be made into good ensilage, or special crops may be grown for the purpose.

Mr. Grueber sowed an early variety of Yorkshire Hero peas; these were pulled and marketed in the ordinary manner. A start was then made by cutting and carting the same day a portion of the remaining haulms. These, it should be mentioned, were absolutely overrun with the small bindweed (*Convolvulus arvensis*) and a quantity of other weeds, notably fat hen.

However, "the more material the more ensilage," as Mr. Grueber pertinently remarked; so everything was carted and stacked. This work extended over fifteen days, being carried on as opportunity permitted, so as not to interfere with more important matters. The first illustration shows the work of carting and stacking, and in the centre may be seen the iron pipe built into the stack, and intended for use with the thermometer. The fence surrounding the stack is a very necessary precaution, as once the stock have acquired the taste for ensilage it is a troublesome matter to keep them from rushing it—no matter how good the surrounding feed. Mr. Grueber had about an acre of these in full flower, but very badly infested with bean aphis—so much so as to be quite worthless as a crop. However, he decided to ensile them; so they were cut with the scythe and immediately carted into the stack.

Pressure, consisting simply of a dead weight in the shape of old timber, beams, &c., to the extent of about 12 cwt., was applied to the finished stack.

Stacking was commenced on 29th December, 1902. The following day the temperature was 90 degrees Fahr., and on the 31st 130 degrees. The maximum temperature reached was 150 degrees, and a gradual fall then took place, until, at the end of January, 1903, 130 degrees was registered. No further records were made, but the fall in temperature would naturally continue until the normal was reached.

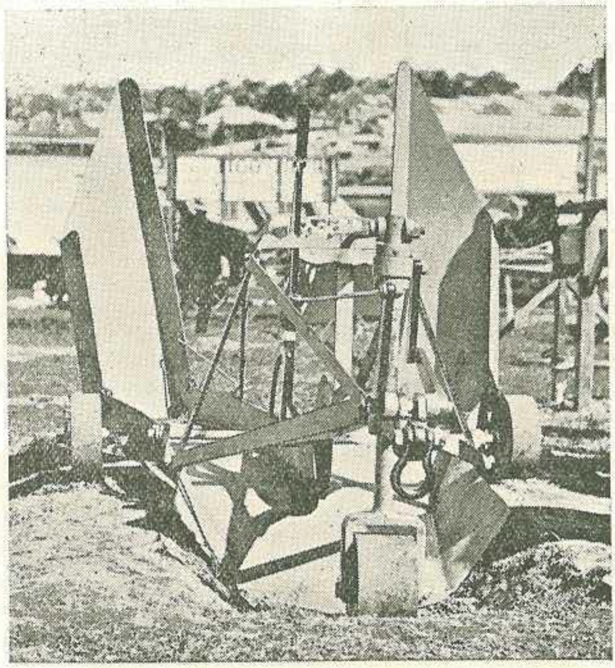


Here, then, we have a stack of ensilage consisting practically of what may be the termed the refuse of a pea crop and a worthless crop of beans, built at no expense, and no pit, silo, or mechanical press used. Yet, when opened, the ensilage proved to be of high quality. I have shown samples of this particular stack to members of branch boards and others at my recent lectures, and Mr. Grueber is good enough to say that he will be pleased to show the result to anyone interested who may care to call upon him.

Another successful ensilage-maker is Mr. Thos. Barwick, of Lambton Farm, Moonah. Mr. Barwick sows a special crop for ensilage purposes, and last April put in about $1\frac{1}{2}$ bushels of Algerian oats, $\frac{1}{2}$-bushel of wheat, and $\frac{1}{2}$-bushel of tares, the crop being cut when in flower, at the latter end of November. Mr. Barwick considers that he can feed three head of cattle on ensilage, as against two made into hay. The previous year no ensilage was made, owing to the premature ripening of the straw through want of rain. Mr. Barwick estimates the loss in milk from this cause at two quarts per cow per day.

DRAIN-MAKING MACHINE.

At the late exhibition at Bowen Park there was exhibited a machine for drain-making, most simple in construction, but evidently well adapted to the purpose for which it is intended. In these times, when irrigation is being



adopted wherever possible, and water has therefore to be conveyed for long distances as cheaply as possible, this machine comes in very appropriately. It scoops out and banks up a drain of exactly the size and depth required. The inventor is Mr. E. Baker, of Bindebango Station, Mitchell.

HARVESTING OPERATIONS.

Harvesting will shortly be in full swing in all parts of the State, and, as there are many who are growing wheat for the first time in Queensland, a few remarks on the subject may not come amiss. There appears to be some doubt as to sufficient labour being available to secure what we trust will prove a record crop since wheat was first grown on the Downs. In the good old days, when labour was scarce on the stations, men thought nothing of a journey on foot to the West. They carried their blankets and cooking utensils (*i.e.*, a billy and frying-pan), some a 6 x 8 tent, and travelling at the rate of from 20 to 25 miles a day, camping comfortably at night before the fire, arrived at Toowoomba in, at the most, four days. Many sturdy men would walk 40 miles a day and think nothing of it, knowing that well-paid work awaited their arrival. There is absolutely no hardship in a walk from Brisbane to the Downs for able-bodied men. We have ourselves carried "bluey" from Mount Perry to Maryborough and from Gympie to Brisbane in the palmy days of copper and alluvial gold mining, and there must be hundreds of men at the present day who would travel to the wheat-growing districts in the same manner, being first assured that good wages awaited the arrival of good men. That work appears to be pretty well assured, seeing that the season has been so favourable for the farmers. However, this matter of labour is beside the question of the method of getting in the crop. It is probable that pretty nearly all the wheat on the farms will be ready for cutting a few days after a commencement has been made. This year much of the wheat will ripen early; indeed, some was in ear as early as August last. Hence reaping may begin early, as the straw will be ripening quicker than the grain, which can draw but little more nourishment whether it be cut or not. There may be some trouble with weeds with the late crops, as these encourage the development of couch, &c. In former times, when wheat was allowed to lie on the ground some time before being bound by hand, the sun killed the green growths, but the use of the reaper and binder may occasion a little more difficulty. In most cases the sheaves may be allowed to lie on the ground for a few hours before stooking, for the hot sun will do good work in that time. Stooks should be made of a moderate size, and if limited to five sheaves on each side, all the better, so as to allow for the play of the sun and the wind.

Should rain come on and the stooks have been thoroughly wetted, as will happen even when they have been capped, it is well to turn the stooks and remake them, putting the end sheaves into the middle and the middle sheaves at the ends, and where the sheaves are dry, but the sap is in evidence, and so carting cannot be done, the stooks may be shifted bodily. This may easily be done by means of a couple of light poles, like strong rake shafts, into which iron or steel prongs or teeth have been inserted in a row at intervals of 6 inches. These poles should be about 9 feet long, and by their help a couple of men will soon shift a number of stooks to fresh ground.

There is an old saying in the old country to the effect that, "When carting hay, mind there is no water in it, but do not trouble about the sap; when carting corn (wheat, barley, and oats) do not mind about water getting in, but get all the sap out"—and there is a great deal of truth in this. Wheat may, indeed, be carted and stacked when the straw is in a very inferior condition—especially if the stack is to stand over the winter before being threshed—but if barley or oats are stacked in similar condition, much damage from over-heating must ensue. In building stacks in a wet season, much may be done to minimise the effects of damp straw by building "chimneys" in the stacks. A chimney is very simply made. A large sack is tightly filled with straw or chaff, and then placed on the ground when the foundation of the stack is made. The sheaves are then built round this sack, which is continually drawn up as the height increases. Thus, when the stack is finished, there is a hole from top to bottom. The chimney should be carried up to the top, until the last few sheaves are in position. It is surprising how very much of the heat that is engendered in the centre of the stack will find its way out, to the great relief of the stacked material. For a circular stack one such chimney is sufficient, but in an oblong one chimneys should be placed about 5 yards apart.

When wheat is in bad condition, stacks should not be large. They may be high, but not very wide. The danger lies in building stacks of great width. In a bad harvest, no oblong stacks should be of greater width at the bottom than 4 yards, and the sides should not be sprung more than is absolutely necessary to enable the drip from the eaves to fall clear of the sides. In the same way, in the case of circular stacks, these should not exceed 6 or 7 yards in diameter for wheat, whilst for oats and barley 5 yards is an ample diameter. If stacks of these dimensions are provided with chimneys, the wheat must be in very bad condition if harm ensues.

Building Stacks.

Too much care cannot be bestowed upon the proper building of the stack. First, the butt end of the sheaves should not be placed higher than the ears. This is a fatal mistake to make, because, as anyone can understand, the sheaves sloping inward conduct the rain into the stack instead of down the roof, and hence much harm is done. Fill in the middle of the stack, so as to form a kind of false roof before finally finishing off. The shape of the stack is, of course, a matter for the farmer's taste, but with a heavy crop oblong stacks are the best, because there will be less of them than of circular ones, and consequently less exposure and loss. Slovenliness in stack-building should not be tolerated.

In commencing the stack, lay down a foundation of some sort: slabs will do. Then begin by forming a stook or cone (perferably round a chimney as above described) in the centre, and keep the sheaf gradually inclining downwards towards the outside of the stack, with the ends directed outward. Always keep the middle full and *higher than the outside*. By so doing, all danger of penetration of rain water will be avoided. The stack must be kept well tramped down, and any projecting ends of the sheaves should be beaten in so as to keep the walls as straight as possible. The height of the rick should not exceed 10 feet to the eaves—8 feet is still better. As soon as the height is reached, the builder should lay one row of sheaves with the butts projecting about 3 inches to form the eave, and then should begin to draw in each row slightly so as to form a kind of pitched roof, and continue in this manner until the rick has narrowed to the width of one sheaf on the top. Then the thatch should be put on. If rain should come on before the stack is finished, fill the middle in well, and cover with a cloth or tarpaulin. Many farmers neglect to thatch their stacks, with the result that much of the upper portion is rotted by the rain water finding its way into it. With moisture rising from below and moisture pouring in above, the losses sustained by such careless stack-building are enormous, and the farmer who neglects obvious precautions has no one but himself to blame and can scarcely claim sympathy.

WHEN TO CUT WHEAT.

It is a common observation that wheat on reaching maturity cannot be cut too green. This is manifestly incorrect. It should be observed that wheat should be cut comparatively green. There are some who hold so tenaciously to the practice of cutting green that they ride their hobby to death, and go so far as to cut their wheat before it is mature. It may, therefore, be well to make a few remarks on this subject before it is too late.

The proper time for cutting wheat would appear to lie between two extremes—*i.e.*, cutting green before maturity, and cutting rotten-ripe when the heads bend down and the crop becomes goose-necked. There must be a certain time when the wheat crop ought to be secured, and a day before or a day after may make a great difference to the grower. What is this certain time? This question will probably never be answered satisfactorily. If we could control the time and the season and the weather, all would be well, and the only thing to be considered would be, What should be the condition of the crop at the proper time? Some say that so long as the grain is just firm, the greenness of the straw may be disregarded. Others maintain that the time to cut is when the grain ceases to be milky, and becomes like curd. One farmer made a very simple test to decide the point. Eight days before a field of wheat was cut, he took about twenty ears, and hung them up in the barn to fully ripen and dry. When the crop was cut, eight days later, he took from near the same spot a further twenty ears, putting them also to harden and dry. When both lots were fully dry, he tested the weight of each. He rubbed out and counted 400 grains from each lot, and carefully weighed them. To his surprise, the fully ripened lot weighed one-seventh more than that taken eight days earlier, and on a second test the result was nearly the same.

According to this simple experiment, the cutting of wheat eight days before fairly ripe would result in a loss of 1 bushel in every 7—rather a serious matter.

Wheat will ripen in the stook, but why should it ripen better there than on its feet? It appears highly improbable that a process which is alleged to take place in the stook should do so there better than in the natural position. The sap must, before cutting, move more continuously than after cutting, and, therefore, it seems clear that early cutting must tend to check the full development of the grain. If the straw is more nutrient when cut green, it must be at the expense of the grain, which has manifestly not obtained all that it could have taken from the straw. If the straw is more nutritious when cut green, then that is an argument against cutting early, as the grain is actually not fully developed.

To sum up—if the entire crop is cut green, it stands to reason that some of it must be greener still; that is, insufficiently filled. If it is cut when fully ripe, some of those late ears will have benefited by the delay.

Strong wheats are rich in gluten, and weak wheats are less rich in that constituent. The greater the accumulation of starch granules, the less the gluten. Hence a weak wheat may be richer in starch than a strong one. At one time, the importance of gluten was greatly exaggerated. To-day, that wheat is considered the best which contains the most starch. When, therefore, we are told that early-cut wheat is stronger, it simply amounts to this: That it contains more gluten; and it could be shown that the strongest wheat—*i.e.*, the richest in gluten of all—is found in chick wheat; that is, in small and immature grain; while the richest wheats are those richest in starch.

It would then appear that the best period to cut wheat is when the grain is fairly hard—say, about the hardness of firm cheese—or when it is easily cut in two by the thumb nail, but not harder. To cut wheat softer than this will probably result in a sacrifice of weight in such grain.

With regard to our inability to control the seasons at harvest time, it is worthy of note that the wheat-growers of the Central Western districts about Barcaldine are in the enviable position of being perfectly independent of the seasons. They sow and harvest their wheat whether it rains or not. They irrigate their land from the bores, they then plough and sow; irrigate again when the wheat is well up, and once more when it is in flower. They then can choose the psychological moment for cutting, rain being a factor with which they have not to reckon.

DEVELOPING NEW VARIETIES OF THE POTATO.

The last volume (XIII., 1903) of the *Journal* of the Bath and West and Southern Counties Society, England, contains some very interesting articles on Agriculture, Dairying, &c., which are quite as applicable to Queensland conditions as to the old country. For instance, take the paper on "Some Essentials of Successful Dairying," by Professor Thonger, which we reproduce on another page. There is scarcely a statement or suggestion in this article which will not apply to the dairying industry of this State. Another article, apparently taken from the *Mark Lane Express Almanac*, deals with the necessity for obtaining new varieties of potato by cross-breeding.

"Why do we want new varieties of potato?" asks Mr. Malden, in the *Almanac*.

Because every variety of potato deteriorates in cropping and disease-resisting powers until it reaches a point when it is no longer profitable to grow. The cultivated potato is in an abnormal condition, its constitution being greatly altered by the high cultivation to which it has been subjected, and because of the long selection in the direction of greater tuberation. To gain new vigour, it is necessary to obtain new varieties by cross-breeding. The effects obtained by cross-breeding are not permanent, and the period during which they are sufficiently marked varies from a few years to, in very rare instances, about twelve or fifteen years. New varieties must, therefore, always be coming forward, otherwise; the something like 2,000,000 acres grown in the United Kingdom would soon be in a parlous condition.

Last year, in a lecture on potato-growing, we mentioned the fact that the name of a potato, not yet in the hands of the farmers and gardeners, would be a familiar household word in the course of a very few years. That name was the

Northern Star. It is a familiar name already. Last year it was put on the [British] market at 10s. per lb., or at the rate of £1,120 per ton. There may be those who would say such a thing is impossible. Those who have no experience in developing new breeds would agree that it is impossible to grow a crop worth £1,000 per acre; but, as the producer has sold several thousand pounds' worth off less than an acre, their opinion is not worth much.

The subject of developing has thus been brought before the public much more prominently than at any previous time. Many new varieties have been brought out, but after a little trial they have been found wanting. In our opinion, after two years of growing, the finest First Early ever produced has been brought out by Mr. Harris under the name of Sir John Llewellyn. We can claim a quarter of a century's experience in growing potatoes on a large scale, and with a special application to early varieties, but nothing we have met with during that time has approached the Sir John Llewellyn. We can truly say we have never seen a diseased tuber. The cropping powers are equal to a main crop; the quality is as near perfection as we have seen in a potato, and it is the earliest to ripen. In these days, when so many potatoes are raised for the early market, the production of this variety is an event of almost national importance, as it will give English growers a strong position against foreign growers, who take so much of the highest prices in the markets. All those who box or sprout their early potatoes should grow this variety.

It must not be thought that developers can make money out of every new new kind brought forward. It is very rare that an exceptional variety turns up. We have had as many as sixty varieties growing at once, all chosen with care from the best introducers, without striking one of special merit. Thousands of new breeds are made every year, and the few varieties in cultivation prove how few are worth cultivation. There are far fewer varieties than the names of those in cultivation suggest, for a good potato is brought out by a large number of people under different names, so developers should take care not to pay a high price for what they think is a new variety, but which is, in reality, an old one which can be purchased for as few shillings under its proper name as they are asked to give pounds for when rechristened.

SANFORD SYSTEM OF IRRIGATION.

The interest now taken in the question of irrigation by all classes of the rural producing community renders it advisable for us to place before our readers everything worthy of note which can be gleaned on this subject. The *Florida Agriculturist* reprints from the *Times-Union* an article showing a method of combining drainage with underground irrigation. People are generally alive to the fact that irrigated lands must be so situated or be of such a texture that superfluous water may pass away naturally, otherwise irrigation is harmful. If land is not porous enough to drain naturally, then some system of drainage must be adopted. At Sanford, U.S.A., a very ingenious method of irrigation and drainage combined is adopted by the farmers.

The irrigation water is derived from a row of artesian wells, only about 30 feet deep, along the upper margin of a field having a slight incline. The field is gridironed with a system of earthenware tile, about 18 inches below the surface, in squares of about 20 feet.

The pipes running down the incline are of glazed tile, water-tight; these are the conducting pipes. The crosspipes are of unglazed tile, not water-tight; these are used both for drainage and irrigation. Being porous, they permit the seepage of water, moistening the soil during a drought; and reversely after excessive rains the soil water is absorbed into the pipes and discharged from the field through the conducting pipe.

At every intersection there is a cemented pocket of a few buckets' capacity, extending to the same depth as the pipes. These pockets are provided with plugs by which the ingress and egress of water can be regulated.

Suppose that somewhere in a 20-acre field there is a section of newly set plants suffering from drought. The problem is how to supply water to this limited area without at the same time irrigating the entire field. Here is the ingenuity of this admirable system.

The trucker first repairs to the pockets in the district to be irrigated, and inserts the plugs into the conducting pipes on the lower sides of the pockets. The water is turned on from the well, flows down to the plugged pockets, turns off laterally into the porous pipes as far as desired, when it is also checked with plugs in that direction. It rises through the soil by capillary attraction, and reaches the surface.

It only takes an hour or two to throw the water underground right where it is wanted, as the firemen direct the streams on a house in a city. It perspires at the surface of the soil, showing plainly all along in the little hollows, and the plants are refreshed.

Suppose, *per contra*, that the field has been drenched by a flooding rain and the crops are suffering from an excess of soil water. The trucker simply shuts off the artesian wells and throws all the pockets in the field wide open by withdrawing the plugs. There is a rapid transfusion into the porous pipes—soil water in sandy lands readily percolates 10 feet laterally—it reaches the conducting pipes, turns down the incline, and is discharged. In an incredibly short time the field can be drained sufficiently to permit the resumption of farming operations.

To this the editor adds that the Sanford system would be described much more correctly if triangular board boxes were substituted for tile, since the latter are but seldom used and have not been found so satisfactory as the cheaper board troughs.

WASTED MANURE THAT MIGHT BE SAVED.

The waste of manure on the farm is of much more consequence than most persons imagine. The natural fertility of soil on the farm has caused land-owners to think that exhaustion of soil fertility is an impossibility, that a succes ion of crops may follow for years, and still abundant yields of grains be produced. This deceptive quality of our rich soils is responsible, in a measure, for encouraging neglect and waste in saving the fertilising materials that are produced on the farm.

The winter season is the time of making and accumulating manure about the stables and byres. The use of these manures as a product of the farm should be as carefully studied and the disposition as carefully made as that of any branch of the farm resources. All farm products should have a commercial value, but with the farmyard manure it is possible that the farmer must be content with its intrinsic value. What this value is can only be determined by its application to crops. There is at this time but little value placed upon the manures of the farm; the easiest way of getting rid of it seems to be the most popular on the majority of farms.

There should be established on every farm, no matter how rich, a system of manure-saving and a system of application; and this should be just as impliedly a part of the farm work as the planting of the crops.

Methods of Saving.

The method of saving manures is a question that admits of some difference of opinion. The advocacy of winter spreading of the farmyard manures has given rise to some discussion as to its advantages and disadvantages. The fact that the greater part of the manures about the stables and yards where stock are kept is not in a proper condition to spread on the ground and get the full advantage that this manure offers is sufficient reason why the winter spreading is a loss. Besides the strawy, coarse manures in the winter season, there is always at this time of the year more or less waste from the washing by rains and melting of snows, which carries the substance of the manures away to deposit along ravines, drains, or be carried off in the streams. The coarser materials are left to bleach and dry on the ground, and be blown away with the first favourable wind.

Winter Spreading.

The winter spreading is argued as being the cheapest means of getting the manure out on the land, as there are then idle time, idle hands, and idle teams that can be employed in this work. This needs no further proof; it is the cheap method, so far as getting rid of the manure at the same time. It makes a good showing about the stables, and argues well for neatness on the farm, to see all such accumulations kept under control.

The Manure Pit.

The other method is to construct a manure basin or receptacle for the manure accumulations and wastes about the farm. A very good plan is to have in some convenient place, where the stable refuse can be readily carted or scraped, a basin made in some low piece of ground sufficiently large to hold all the manure. This may need to have the bottom cemented, so as to hold the liquid manure and the rains and wash from the adjoining higher grounds that naturally will gather into it, and help to rot the heap. Into this basin the manures are deposited, always observing to spread out evenly so as to avoid as much as possible any firing by heating. The wetting by rains will assist to keep down any damaging influence by heating, and the whole basin may be thus gradually piled high with refuse straw, hay, manures, and refuse, and all be converted into a most excellent quality of well-rotted manure.

The basin system of saving and rotting manure contemplates the keeping this manure over summer in the basin, and in the process of rotting.

The extent of the fertilising materials on the farm is almost without limit, when a proper method of converting them into a suitable product is devised. There are old stack bottoms often burned to get them out of the way, and straw stacks treated in the same way; the stable and feed yard refuse can be gathered with a horse-scraper and added to the fertiliser stock. It sometimes is found of great advantage to add to coarse strawy materials a few loads of rich top soil to help put it in better condition for decomposing. Study your situation as to the need of these fertilisers for any or all of your crops. Study the lie of the ground about your buildings, and see where the easiest drainage can be constructed to carry off all the sewage and water that accumulate about the yards, then construct a manure reservoir.

THE KANSAS WHEAT CROP.

From late files of the home papers, we learn that a labour famine prevailed last month in the Kansas wheat belt. One journal says that two negroes put their services for harvest up to auction, and they were purchased for 13s. per day each—rather a stiff price. It is also stated, on the same veracious authority, that forty farmers of Rush county held up a west-bound train in search of harvest hands.

The train was held up by means of waving a lantern, over which was tied a red handkerchief. The farmers swarmed into it, and offered from 10s. to 12s. a day to any willing to work. At least 20,000 more workers are wanted. A first-class stacker has sold his services for £1 4s. a day.

Our farmers are looking forward to a scarcity of labour during the forthcoming harvest, but it is not at all probable that the labour market will be in such a state that the Downs farmers will stop the Western-bound trains in earch of farm labourers.

FLAX-GROWING IN VICTORIA.

A PROFITABLE INDUSTRY.

A volume might be written on the unsuccessful attempts which have been made during the last twenty years to establish the flax-growing industry in Victoria. It has been boomed, and bonused, and experimented with, only to prove time and again that on old-world lines of practice, which involve costly and laborious methods, it was unsuited to our conditions of agriculture, and had to give place to more remunerative crops. Flax-growing—which is an important crop in many of the Continental countries of Europe; in India, where labour is cheap; and singularly enough, in Argentine, where it is grown almost exclusively for the seed, to the extent of nearly 1,000,000 acres—appeared to hold out no immediate hope of promise to the Victorian farmer.

Messrs. Wolff Bros.

But it has been reserved for three young German settlers, Messrs. Wolff Bros., of Traralgon, after devoting several years to the exclusive cultivation of flax, both for seed and fibre, in which patient experimental work, close observation, and clever resourcefulness have been displayed, to put in operation new processes which supersede the old-world methods in simplicity and economy, and are equally effective. It has always been held and practised, and adopted in the early experiments here, that a crop of good fibre and seed could not be obtained from the same field; that in order to get good fibre the crop had to be harvested when in blossom, before the seed had ripened; and that above all it had to be hand-pulled—a very costly and laborious process. Messrs. Wolff have proved that both seed and fibre can be obtained from the same crop, after the seed has thoroughly ripened, and that so unnecessary is hand-pulling that fibre which will command the top price when submitted to expert European buyers is produced when they turn into their flax fields with the reaper and binder, and cut it down at the rate of 10 to 12 acres a day. For the old process of pit-retting (that is, steeping straw for several weeks in pits of water) they have substituted the much more simple one of spreading it out on the grass in the autumn to let the dew and rain do the work; and, instead of rippling out the seed, they have mounted two wooden rollers, one above the other, and, between these two, men can feed the sheaf heads without untying the binder knot, and thrash out the seed perfectly at the rate of over 2 acres a day.

Returns per Acre.

Messrs. Wolff had 120 acres under flax last year. Their gross returns from this area in seed and fibre will amount to £2,000, or at the rate of £16 16s. per acre; and after paying away in rent, cost of cultivation, and all the processes of harvesting, threshing, and fibre manufacture over £8 per acre, they will net the handsome profit of £8 or £8 10s. per acre. They are extending their operations this year. While one brother, Mr. G. Wolff, remains in charge of the work at Traralgon, another is superintending 300 acres of flax which they have nearly completed sowing at Maffra, where they have leased land for the purpose; and the third has gone to Europe for the purpose of finding out if new machinery and appliances can still further be adapted to their work.

A visit to Messrs Wolff Bros.' farm, about 6 miles out of Traralgon, where the work of converting flax straw into fibre is still going on, is full of interest, and, after obtaining from Mr. G. Wolff the story of their persistent effort in overcoming the many difficulties they have met with, and their ultimate triumph in placing the industry on a sound paying basis, there remains a hope that flax-growing may become an important factor in our rural production.

Progress and Prices.

"We began flax-growing," said Mr. Wolff, "six or seven years ago on our own selection at Calligun, but the results were not very encouraging at the beginning. We followed the old methods of hand-pulling and pit-retting, and the labour and cost of these operations left little profit. Experiments we carried out convinced us that we could let the seed ripen, and still have good fibre, and that the latter would command top market price when cut instead of hand-pulled, and when dew-retted instead of pit-retted. In proof of that, I may say that we sent samples of the flax treated in this way to some of the largest flax-buyers in Europe, and last year we received an offer from a Belgium firm of £45 per ton for 10 tons delivered in Melbourne. But we have had no trouble in selling all we can produce to Messrs. Miller and Co. at fair prices. Three years ago we received £40 per ton, last year £45, and this year £42, and at these prices, with the methods we have adopted, flax-growing will pay well. Three years ago we moved down here, and paid a rental of £1 per acre, and extended our operations. This year we had 120 acres under flax. Our average return of seed was 14 bushels per acre, which we have sold readily at £14 per ton for linseed-oil making, which works out at 7s. 6d. per bushel, and when we finish the flax it will average 5½ cwt. to the acre, which is £11 11s. per acre; so that our gross returns will run into £16 16s. per acre. We intend to stick to it, and largely extend our operations. We have rented 300 acres at Maffra at £1 per acre, and one of my brothers is just finishing the sowing of that area. We have found that spring sowing, which is followed in Europe, is a mistake. The time to sow is the month of May. We sow broadcast 1¼ bushels per acre. We have tried the new variety, 'White Belgian,' the Department of Agriculture is recommending, but we prefer the old variety, 'Riga.' The latter gives a greater quantity of fibre and seed per acre, and, if got in early, there is no fear of the boll worm attacking the seed pods. We had 40 acres hand-pulled this year in order to get absolutely pure and clean seed for the Maffra farm.

METHODS OF CUTTING AND THRESHING.

"We found great difficulty at first," Mr. Wollf continued, "in cutting with the binder. The secret is in keeping the knives sharp. We keep them as sharp as razors, and can turn in now and knock it down at the rate of 10 and 12 acres a day, the sheaves being beautifully even, and not at all tangled. We find there is really less loss with seed shaking out than with other grain crops. After standing in stooks in the paddock for about a fortnight, it can be either threshed and the straw stacked, or stacked as it is and threshed at leisure. We prefer round stacks, as the heads are bulky, and do not build well into square stacks.

"Our method of threshing is primitive, but we get all the seed out quickly and without injury. Here it is—just two wooden rollers, 2 feet diameter each, set one above the other, on spindles. The spindle of the upper one works in slot-holes, with a perpendicular play of about 2 inches, and to the spindle of the lower one is attached a wooden pulley, and on this is placed a belt from the 5-horse power oil-engine, which drives the 'breaker' and the 'scutcher.' It is driven at the rate of 140 revolutions per minute. One man feeds in the sheaves without untying them, and another takes them away. The seed is all crushed, and then cleaned ready for the market by being put through an ordinary grain winnower. Two men can thus thrash out about 2 or 3 acres per day. We do all our work by contract, after the crop is harvested. We pay 6d. per bushel for threshing, and 2d. per bushel for cleaning, and provide the machinery. A bushel weighs 56lb.

MANUFACTURING THE FIBRE.

"Our methods of flax manufacture are equally simple. The crop remains in the stacks till about the beginning of March. We then begin carting out and spreading on the grass land. An acre of grass land provides room for 2 acres of crop. We grow a good length of straw here, averaging about 2 feet 6 inches. The bundles, after the seed is removed, are untied and spread out evenly in a thin layer on the ground, and, if there have been good rains and heavy dews, the straw is ready for turning in a fortnight; the swathes are rapidly turned over with a long pole, and left out another fortnight or three weeks. Then it is gathered up loose in thin round stooks to dry for two or three days, then tied into handy bundles with the binder strings, which are saved for the purpose, and carted and re-stacked close to the shed where the flax is manufactured. We do the tying, carting, and stacking in the afternoon, when the dew is off and the weather dry, and when it is again in the stack it must be kept dry till finally dealt with.

"The 'breaker' and the 'scutcher' we have were both imported for us by Mr. Miller, the rope manufacturer, who buys all our flax and has taken a great interest in the work of flax-growing. The 'breaker' cost £35, and the 'scutcher' £40, and both are driven with the oil-engine. The 'breaker' consists of four fluted iron rollers in two sets, which turn half round and back. The straw is passed through between these sets, and they break out the woody material in the stems and leave the fibre with a lot of these woody particles adhering to it, and the 'scutcher,' which is simply a set of wooden blades revolving rapidly past an iron shield, clean these off and leave the fibre ready for market. The fibre is put up in 14 lb. bundles and packed in wool bales holding about 5 cwt.

Labour and Wages.

"We employ regularly for months about twelve men and boys, and work in shifts in the factory day and night. All the work is by contract, so you can readily find the cost. Spreading out costs 7s. 6d. per acre; turning over with the pole, 2s.; stooking, re-tying, and carting in, 10s. per acre. And in the factory we pay 10d. per stone of 14 lb. to the men, and we reckon it costs us another 2d. per stone for the engine and the wear and tear. All the work is light; boys can do the breaking, and earn 4s. and 4s. 6d. for eight hours. Scutching requires more skill. A good man can earn 7s. a day of eight hours; ordinary hands 6s. Spreaders make about 5s. per day. One advantage to country districts is the amount of light labour it provides. We will distribute in wages this year about £8 per acre, and will net a similar amount for ourselves; and we feel sure that if the industry extends, when the local demand is filled, there will be a good field for export both for seed and fibre. But farmers ought to be told that it is no good going into flax-growing unless the work is done thoroughly. The land requires to be well cultivated and free from weeds, and it will not pay to bother with small lots. One merit the crop has is that it is not easily injured by the weather, and can be handled at leisure."

Unlimited Markets.

It may be noted that the imports of linseed into Great Britain in 1900 amounted to over £4,000,000 sterling; linseed cake for cattle feeding to £1,500,000; and flax to over £2,500,000. In 1901 Argentina shipped linseed to Great Britain to the amount of £1,500,000 sterling, and reports are to hand that some of the Australian harvesters sent over for the first time to that country last year stripped linseed crops very successfully, and now that it has been proved that early autumn sowing is clearly the proper course, the crop should be worth a trial in the northern districts, even for the seed alone.

Small experimental plots of flax have been successfully grown from time to time in the Goulburn Valley and in the Mallee, but they have suffered occasionally from the attacks of the "ball" worm, the larvæ of a small moth which pierces the seed head and destroys the seed, and to obviate this the Department of Agriculture is distributing samples of seed of an early variety known as "White Belgian," which matures before the moth begins to lays its eggs. Mr. Wolff thinks that early sowing in well-tilled land of the ordinary variety of flax, "Riga," is all that is required. The success which has been attained by the Messrs. Wolff in flax-growing should encourage the Department to persevere in disseminating information on this important industry.—*The Argus.*

UTILISATION OF SWAMP LANDS.

In concluding a series of interesting articles on "Irrigation of the Murray and Utilisation of Swamp Lands," published in the *South Australian Journal of Agriculture*, the Hon. A. J. Perkins, Secretary for Agriculture, says:—Messrs. Guthrie and Helms state with regard to wheat that "with from 0·05 to 0·1 per cent. of common salt germination is somewhat retarded; the plants are less vigorous, but recover and grow well." On the other hand, the experience of other countries goes far to prove that plants will frequently tolerate from five to ten times that amount of salt, providing the soil is maintained in a suitable state of humidity, and excessive soil evaporation is checked. The danger, as has already been pointed out, lies in the concentration of the salt in the surface layers; and this I hope to show can readily be avoided here. I infer, therefore, that the amount of salt at present found in the swamp soil is not likely to exercise an injurious effect on plant life, always providing irrigation be judiciously managed.

The detection of salt in the arable portion of the swamp cannot, however, but remain a matter of some anxiety. It may well be asked whether in the future it may not show a tendency to accumulate beyond the point of endurance of plants. Although I cannot pretend to be in possession of all data necessary to the elucidation of this question, I am in a position, I believe, to forecast fairly accurately the future trend of events. Towards the end of this article I shall endeavour to show on what lines future investigations could be profitably conducted.

Let me first recall the fact that the swamp slopes gently back from the ordinary river channel towards higher cliffs that help to confine the rising waters at flood time. Prior to reclamation, as a flood subsided, the waters gradually drained off to the back of the swamp, where, in all probability, they came under the influence of more or less intense evaporation, at a time when the higher levels were rapidly clothing themselves with verdure. It is a fact of universal experience that no running waters are absolutely devoid of soluble salts; and these retreating waters, left ultimately to evaporate at the back of the swamp, can have formed no exception to the rule. Part they owed to what the river had acquired from contact with earth on its seaward journey, and part from more or less lengthy contact with the upper levels of the swamp during their slow and gradual retreat towards their final resting place.

* * * * * * * *

Is salt, the presence of which is undeniable, going to prove an insuperable difficulty in the irrigation of the swamps? To this question I have no hesitation in advancing an emphatic negative. Let us consider it first in its relations to the higher and cultivated levels, and then to the lower and at present sterile levels.

Seeds, in the process of germination, are peculiarly sensitive to the action of salt; and whilst I am not prepared to deny that a succession of low river years might not tend to accumulate salt in the surface layers of certain patches unduly exposed to soil evaporation, even on the higher levels, to the extent of hindering germination, I am firmly convinced that, given careful management, there is no likelihood of the soil becoming, at any time, so impregnated as to refuse to carry profitably thickly sown herbaceous plants. The salts present are exceedingly soluble, and, unlike sodium carbonate, exercise no injurious action on the physical condition of the soil. Under ordinary conditions, the natural drainage of the irrigation waters towards the back of the swamps should prove sufficient to carry with it the bulk of the saline matters introduced. With the moisture that is retained by the soil, some portion of the salt must of course remain; part of it will be taken up by plants; and what remains will at later periods be largely removed by irrigation waters drawn from a high or flooded river, comparatively poor in soluble salts. And further, should the salt at any time accidentally accumulate to an inconvenient degree, there can be no special difficulty in removing it by flooding with high river water. Sodium chloride is extremely soluble, and will wash out readily; the same may generally be said of magnesium sulphate; the latter may further be rendered innocuous by an average dressing of lime that will convert it into magnesium carbonate.

These facts, notwithstanding our climatic conditions, are such that no more the irrigationist on the swamps than his less favoured brother on higher levels can afford to overlook the disastrous effect of unchecked soil evaporation; if there is one maxim that both should bear in mind, it is summed up in four words —Keep the Soil Green. To whatever use it may be put, whether it is grown for grain, root, fodder, or even green manure, let crop succeed crop, and the danger of the rise of the salt will be reduced to a minimum.

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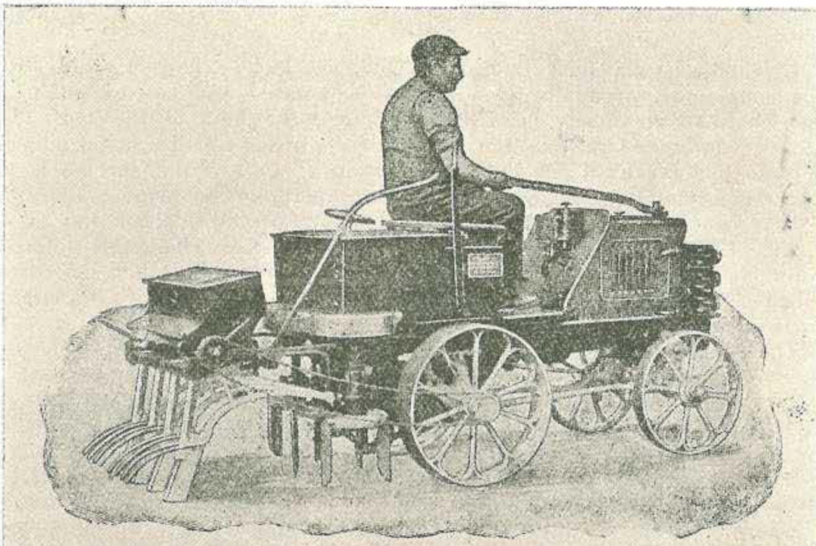
By capillarity the subsoil moisture, now more or less charged with soluble saline compounds, ascends to the surface, is evaporated, and leaves in the upper layers what had previously been dispersed over the bulk of the soil. This process is continuous, and in the course of centuries results, under climatic conditions that favour it, in the accumulation of salt in the surface layers. Dense vegetation, by replacing surface soil evaporation by plant evaporation, and by screening the soil from intense heat, tends to keep in check the rise of the salt. Unfortunately, such vegetation does not usually characterise climatic conditions of the type we have in view; or, at all events, it is but short-lived, and leaves the plain bleak and bare at those times of the year when evaporation is most intense and the rise of salt most marked.

Tillage, when well conducted, must necessarily tend to minimise the evil. Winter operations, ploughing, scarifying, &c., by stirring and mixing the land, help to spread over a greater bulk of soil the salt deposit that summer evaporation had left on the surface. The summer cultivation of fallow land, by reducing evaporation to a minimum, must also check the rise of saline matters. Nor must we forget the action of the thicker and more luxuriant vegetation that the soil yields under cultivation, and that is periodically removed from it in the form of fodder or grain. The different substances that we denominate "salt" are, perhaps, not essential to the development of plants, even in the most pronounced state of dilution. They are, nevertheless, soluble, and some portion of them must pass into the tissues of plants during the period of growth, and are thus in part removed from the land. After all, it is only the presence in the soil moisture of salt in a state of concentration more or less pronounced that the plants fear.

If tillage and the growth of cultivated plants tend to check the dangerous accumulation of salt, the same cannot, unfortunately, be said of irrigation as it is usually practised. It may, in fact, be said that, under climatic conditions rendering inevitable this phenomenon, irrigation only helps to accentuate it. Particularly is this true when it is shrubs or trees that the irrigated land carries, leaving it as they do naked and unprotected throughout the year. The soil generally receives the water during the drier and hotter portions of the year when evaporation is more intense; no provision is usually made for artificial under-drainage whereby the surplus salt-laden moisture might be removed; subsequent tillage is not always as perfect as it should be. And thus during a time of the year when their action is most potent we find united many factors, the ultimate effect of which is to multiply many fold the already hurtful action of the unaided winter rains. Replace, however, shrubs and trees by a thick sward of grass, a field of lucerne, or any other association of densely growing plants, and the baleful effect of soil evaporation disappears and with it the appearance of salt in the surface layers. It may well be asked, Are we justified, when confronted with climatic conditions that render irrigation indispensable, in tilling our orchards and vineyards on the lines that obtain in districts in which irrigation is not in use? Were it not wiser to allow, nay to encourage, during the summer months an undergrowth of dense vegetation that could be ploughed under from time to time? This practice would, perhaps, absorb greater quantities of water, but the soil would be enriched, and, what is of equal importance, the rise of salt would be effectively checked.

THE SCOTT MOTOR CULTIVATOR.

Although the motor cultivator has not yet been employed in Queensland in the farming districts, yet its advent is merely a question of time. Once it has been satisfactorily shown that, by its use, the expense of cultivating the land can be reduced to less than half that incurred by the employment of steam or horses, the day of the motor cultivator will have dawned. In the last issue of the *Farmer and Stockbreeder* there is an illustration, here reproduced, of the



THE SCOTT MOTOR CULTIVATOR.

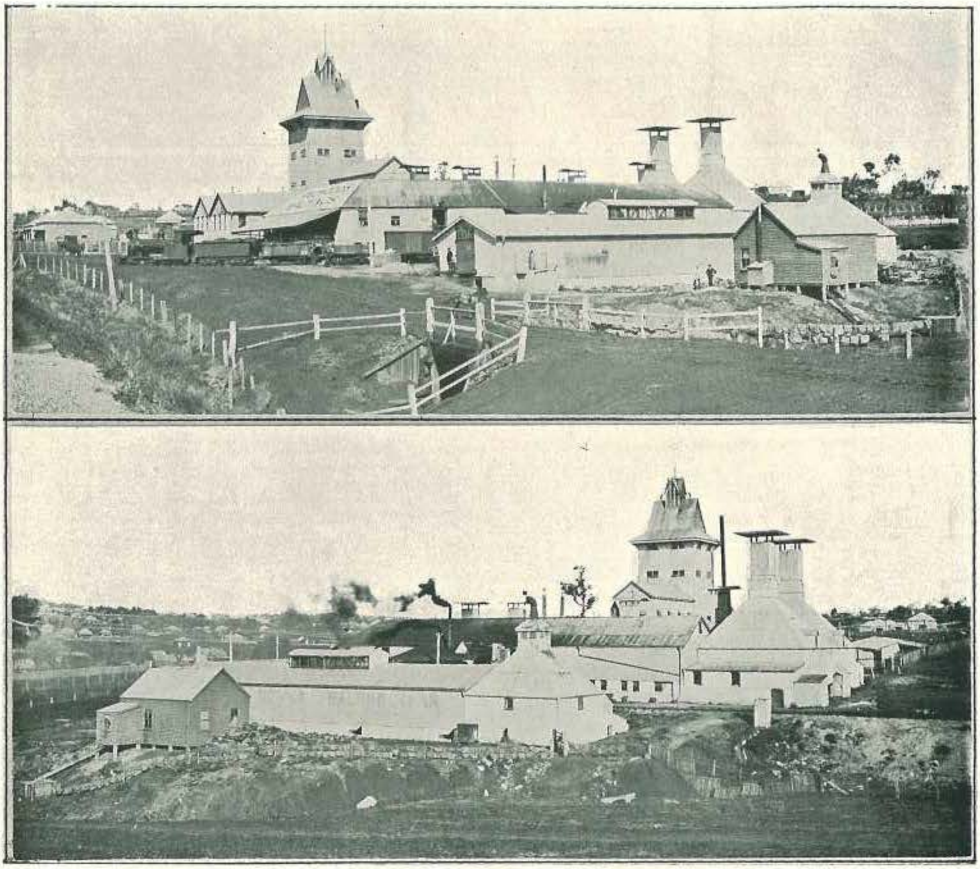
latest type of such a machine, which is thus described by that progressive journal:—

"Among the new and important self-propelling implements exhibited at the Royal Show was the Scott motor cultivator. This machine is capable of adaptations to a great many operations on the farm. In the illustration it is shown as a cultivator with a seed drill attachment, but it also ploughs, mows, reaps, threshes, drives belting, and can be used for general traction purposes. At one operation it is claimed to give a perfect seed bed, whether the land be strong clay or light sandy soil. Compared with either steam or horse tackle, the cost is much less. It is claimed that by a slight interchange of the parts the motor will cultivate and seed the land, reap and thresh the crop, and carry it to the market. Such simple operations as grinding, chaffing, churning, pumping, &c., are all capable of being performed.

"The motor is 10 h.p., and the motive power is got by a Sims' motor. It is estimated that motor and horse cultivation figure out as follows:—

MOTOR CULTIVATION. One day's work—6 acres.	s.	d.	HORSE CULTIVATION. One day's work—1 acre.	s.	d.
Interest, wear and tear, and depreciation on £300 ...	7	3	Two horses at 3s. 3d. each per day	6	6
Petrol and lubricating oil ...	11	9	One man's wages	3	6
One man's wages	5	0			
Cost of working 6 acres ...	24	0			
Cost of complete cultivation, per acre	4	0	Cost of ploughing only, per acre	10	0

Plate XIV.



THE MALTING-HOUSE.

"With regard to the average worked in a day, speed varies according to the depth worked, class of soil, and power of motor. Travelling at 3 miles an hour, with a 4-foot width, 14½ acres a day can be covered The motor has been brought out by Mr. John Scott, 12 North street, Andrew street, Edinburgh."

A RISING INDUSTRY—A QUEENSLAND MALTING-HOUSE.

Where the South Australian Seed Wheat was Cleaned and Distributed.

The pioneers of malting in Queensland were Messrs. Perkins and Co., who erected a malthouse in Toowoomba over twenty years ago, but their efforts were somewhat desultory, as the farmers were not educated up to the production of suitable grain, and at that time there was no protective duty on malt. In the early nineties the late Mr. J. G. Sims induced some farmers to cultivate malting barley, and leased the disused malthouse from Perkins and Co.

In spite of great difficulties, consisting, firstly, of the apathy and lack of knowledge of the farmers, and, secondly, of the strong prejudice of brewers and business men whose opinions were even proclaimed in Parliament that Queensland could not produce malt, Mr. Sims earnestly undertook the work of malting. In 1895 he was joined by Mr. Vernon C. Redwood, who came from New Zealand, where his family had been successful maltsters for many years. But the Redwoods were not only maltsters, but farmers in New Zealand, so that Mr. Redwood came to Queensland prepared not only to make malt, but to instruct the farmers how to grow, garner, and thrash the grain to provide the maltster with the perfection of raw material.

By the contribution of essays and papers to the agricultural societies, letters to the Press, and oral instructions to inquirers, Mr. Redwood inspired the farmers with confidence as to the prospects of success in the industry, and induced a great annual increase in the cultivation of the cereal.

Allured by the prospects on the Darling Downs, others of Mr. Redwood's family migrated from New Zealand, where Mr. Charles Redwood, senior, was one of the pioneer maltsters and barley-growers.

In 1896 Mr. A. H. Redwood built what is now known as the "Small malthouse," at Black Gully, while Mr. V. C. Redwood took over Perkins and Co's house, and Mr. Sims left to build a malthouse at Warwick. Mr. V. C. Redwood made the malting for Perkins and Co. such a success that the firm ultimately built a large malthouse of brick. Meantime the Black Gully malthouse was purchased by the Queensland Malting Company who, in 1899, erected other very expensive premises, now known as the "Big malthouse."

On first of June, 1901, the premises and business of the Queensland Malting Company were purchased by Messrs. P. O'Brien and V. C. Redwood, but before the end of the year Mr. Redwood purchased his partner's interest, and now conducts the very extensive business in his own name, in conjunction with his father and brothers.

The practical object lesson provided by the great success of the Toowoomba malthouses has been appreciated by the Downs farmers, as demonstrated by the fact that, whereas ten years ago the crop of malting barley was insignificant, in 1898 over 19,000 bushels of malt were made from local barley, in 1902 75,500 bushels of malt were the product of local grain besides large quantities used otherwise, and it is confidently expected that the yield this year will be at least double that amount.

Up to 1901 the local crop of barley had not been quite sufficient to meet the demand of the Toowoomba maltsters, who have used much grain imported from America and New Zealand; and last year's crop having been a failure, owing to the late deplorable drought, practically all the grain malted this year has been imported.

It is very gratifying to our farmers, and to the Queensland public generally, to find Mr. Redwood emphatic in pronouncing the locally-grown barley to be far superior for malting to any that has been imported. This is especially satisfactory as demonstrating that there need not be any fear of over-production; for, if the local demand is exceeded, a superior article will always command a ready export market.

Mr. Vernon C. Redwood's Black Gully Malthouses, which are here illustrated (Plate XIV.), are situated about a mile from Toowoomba adjacent to the main Southern and Western Railway line with which the premises are connected by a double loop line, known as "Redwood's Siding." A powerful steam winch located on the siding enables the staff to shunt a siding full of trucks when a locomotive is not available. This is a great convenience in the busy season, when the siding is full of trucks and wagons. The grain is hoisted from the wagons to the top floor platform by means of powerful steam whips by which 400 tons of grain can be unloaded in a day. In despatching grain the bags are tipped into shoots, down which they slide by gravitation, and it follows that grain can be despatched much faster even than the rapid rate at which it is unloaded. The receiving platform and the adjacent siding are roofed over, so that trucks can be loaded or unloaded in bad weather with impunity.

The malthouses are two floors in height. The ground floors are almost exclusively taken up by the germinating floors, which are of polished cement. The kiln furnaces and fuel chambers are also on the ground floor. These are depicted in the illustrations herewith.

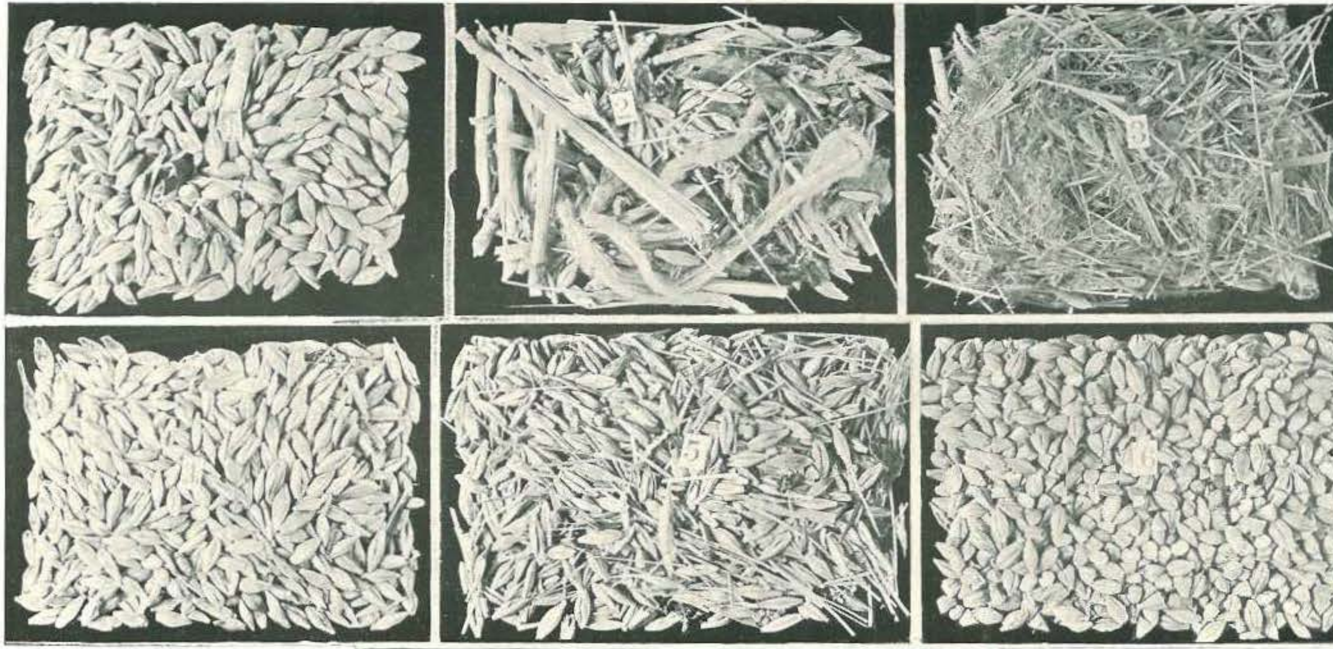
On the upper floor are the offices and the machinery, but most of the space is devoted to the storage of grain, and to the malt bins. At the western end of the buildings are the drying-kilns, whose ventilators are conspicuous in the illustration. North of the malthouse is a large grain store, with concrete floor, connected with the big malthouse by a gangway. The total floor space of the three buildings is close on 50,000 square feet, and, as almost the whole of this could, if necessary, be devoted to the storage of grain, it is apparent that a tremendous quantity could be stacked in these buildings. The largest quantity of grain that Mr. Redwood's staff have handled was put through in the early part of this year, when the Government seed wheat and barley, and Mr. Redwood's own supplies arrived simultaneously. One hundred and twenty-three thousand bushels of grain were received, cleaned, graded, bagged, and despatched in various-sized parcels to multitudinous destinations in a remarkably short space of time. The Government seed wheat comprised over twenty varieties, yet there was not one mistake made in distributing to the hundreds of farmers the varieties which were allotted to them, which speaks volumes for the care of the malthouse staff, and skilful organisation of the management.

As it would be interesting to the farmers who got Government seed to learn something of the process by which it was cleaned and graded, we give a description below; and, from what we saw of the results of these processes, it appeared to be a sheer impossibility for any grain to pass through them without being divested of every shred of foreign matter, of broken or of strange grain, before being finally bagged and sent out.

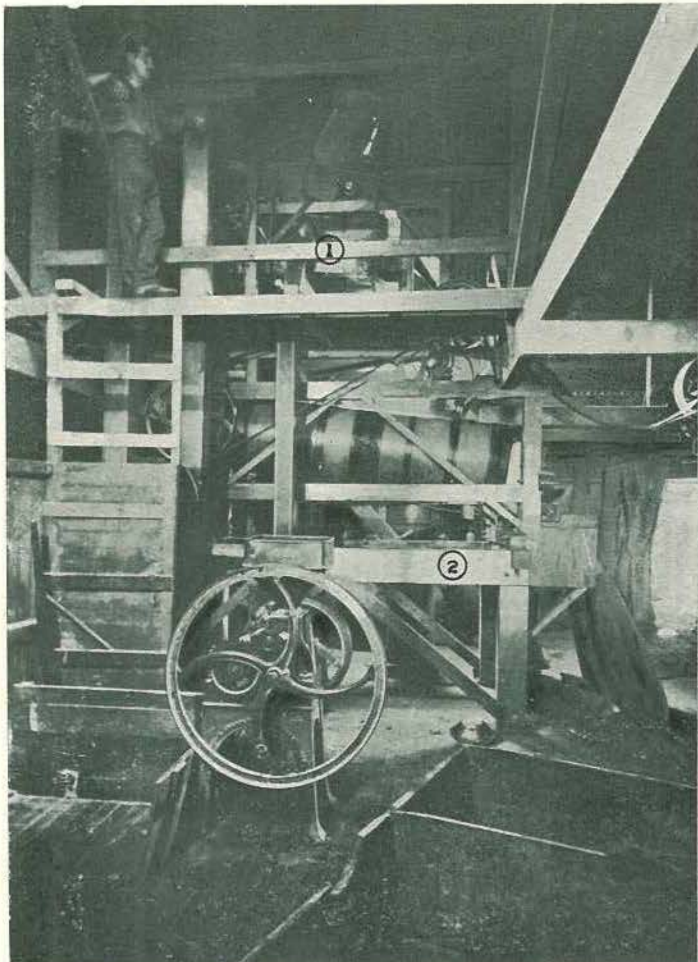
THE CLEANING MACHINE.

The grain as it comes from the farm (Plate XIVA.) goes into an elevator 20 feet above the top of the machine, and then falls into a hopper provided with a regulator which equalises the grain, which, falling through an open

Plate XIVA.



1. Original Sample.
2. Large Substance.
3. Blowings.
4. Seconds.
5. Thirds or Refuse.
6. Half-grain.
7. No. 1 Sample after Dressing.



Figs. 1 and 2.—Cleaning Machinery.

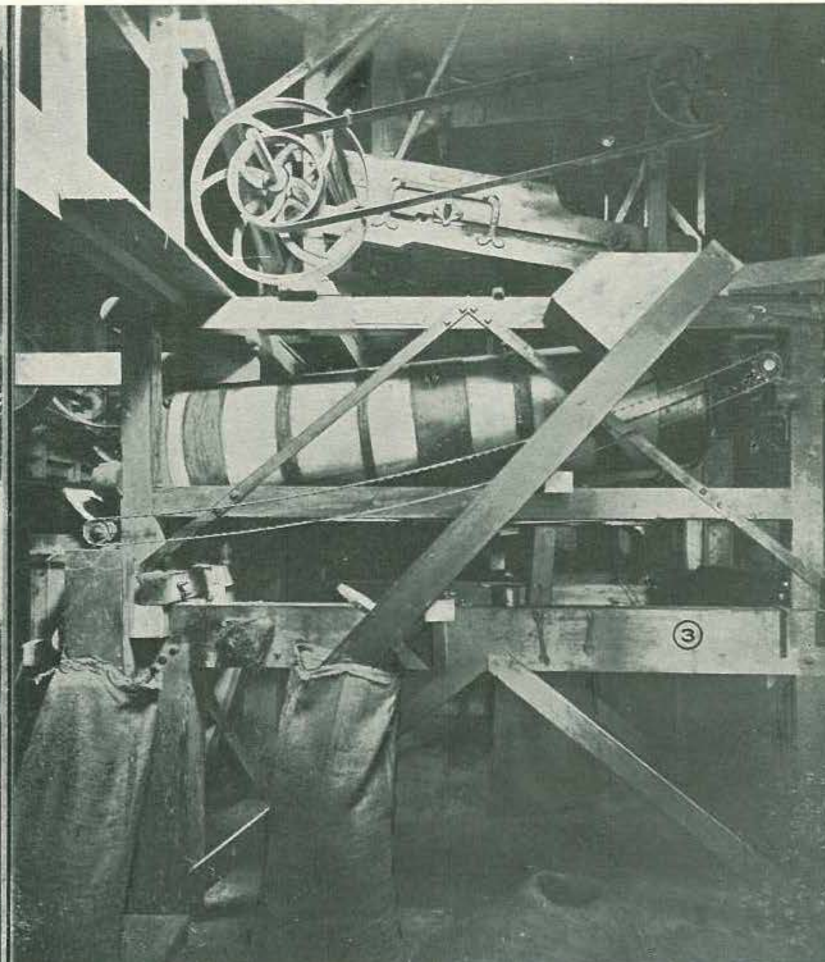


Fig. 3.—Half-grain Cylinders.

space, is subjected to a strong blast of air, which drives out all straw, dust, and impurities. (Figs. 1 and 2, Plate XV.) The fine dust passes into the dustroom. Of this dust there are two classes; the best, coming from the first blast, is discharged into a special receptacle, and the worst falls through a dusthole to be removed to a dust heap.

Then the grain falls into a riddle, which takes out all the small seeds, and from here it passes to a larger riddle (shaker) which removes all foreign stuff, but allows the grain to fall through. Throughout all the processes something not wanted is being taken out of the grain, which now passes out, still somewhat dirty. Leaving the shakers or riddles, the grain passes over a tray, where it is again subjected to a still stronger blast which takes out all weevily or light grain. Now it travels on to a self-cleaning riddle, which detaches any substance larger than the grain, and finally reaches the last and most important self-cleaning riddle. Ten separate classes of grain are thus separated from each other.

When cleaned, the grain has more processes yet to go through. It falls into another hopper and is conveyed into two half-grain cylinders, 12 feet long by 2 feet 6 inches in diameter, having a capacity of 200 bushels per hour. These cylinders separate the half-grains from the good grains, which latter are now delivered into bags. (Fig. 3, Plate XV.)

For the purposes of malting, an abundant supply of pure water is essential, and this Mr. Redwood obtains from three wells, about 40 feet deep, fitted with steam pumps.

There are placed in the malthouse four storage tanks, which contain altogether 10,000 gallons of water. The process of malting may be briefly described as follows:—After being cleaned and graded, the grain is raised by steam whips to a platform, from whence it is poured through shoots into the steeps. It is kept in the steeps for about two days, during which time the water is frequently drawn off and replenished, thus ensuring its keeping cool and sweet. From the steeps the grain is taken and spread upon the germinating floors (Fig. 1, Plate XVI.), which are of polished cement, kept scrupulously clean. Here germination takes place, the period of growth allowed being from nine to ten days. An illustration herewith shows the grain at different stages of its growth.

During this period of growth the utmost care and vigilance are demanded from the maltster to insure the proper development of malt, and prevent mould or other deleterious growth.

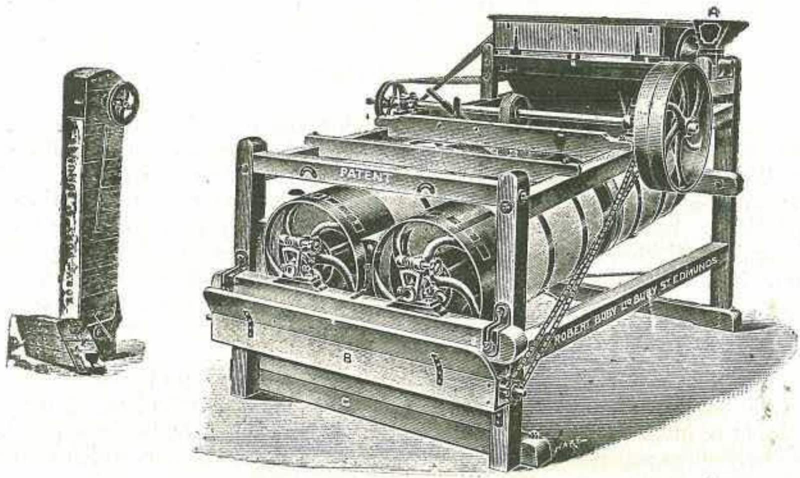
The depth of grain on the floor is gradually diminished, and it is frequently, sometimes almost constantly, turned over, to insure that the grain shall progress absolutely evenly throughout. When it is remembered that different parcels of grain, though of apparently similar grade and character, often grow differently, it will be apparent what a fund of expert knowledge, and what unceasing viligance are requisite for the maltster.

The period of growth being completed, and the shoots somewhat withered, the grain is raised by means of endless elevators to the drying-kiln, where the process of drying off occupies about four days.

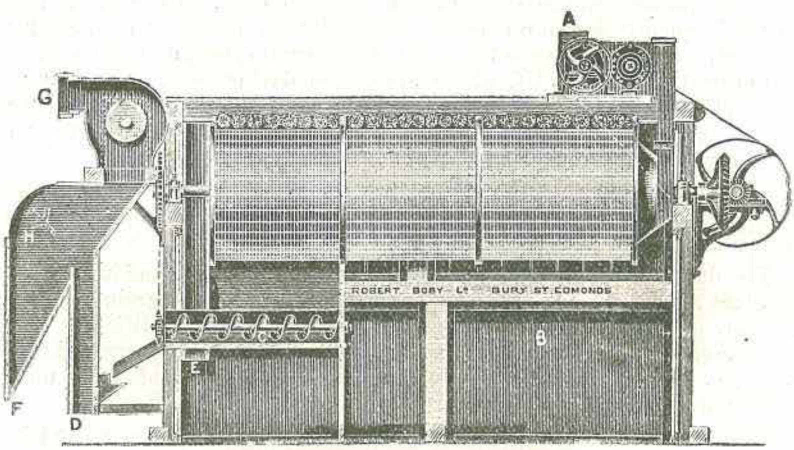
The heat required for drying off is derived from large furnaces on the ground floor of the kiln, which burn coke of which only the very best and cleanest can be used, as any smoke or noxious gas sent up with the heat would damage the malt.

Mr. Redwood uses coke supplied by Mr. John Wright, of Tivoli, near Ipswich.

From the kiln it is conveyed by shoots to the assimilating bins, in which it is allowed to mature before being conveyed to the storage bins. It is usually kept in the storage bins for from four to six months ere it is finally prepared for despatch to the brewer. This final preparation consists in dressing and polishing through a machine which removes the sprouts and rootlets, which are



then called combings. In the machine above illustrated, the feed is at A. The malt first passes through the polisher, thence to a screen. when the combings fall into the space B, which is enclosed to prevent the escape of dust, but the shutters are removable for cleaning-out purposes. The good malt travels through the last section of the wire barrel and falls at C, larger substances pass out at E. The malt then falls through the exhaust trunk at D, whilst the faulty or hollow grains, straws, and the like are extracted and discharged at F.

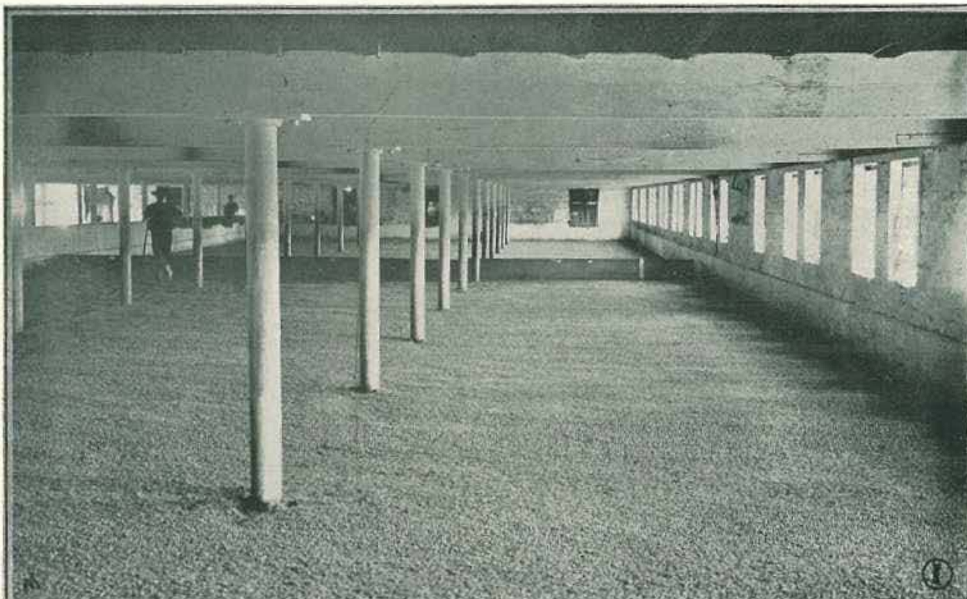


From the polisher it is carried into a steam steel wire screen, travels some 200 feet, and emerges at the other end into a broader screen, which allows the grain, but nothing else, to pass through it. A strong exhaust fan plays upon the grain as it falls, which takes out all injured grains and every sort of extraneous matter which may have got into it in its travels. As before, all fine dust is driven into the dustroom. This completes the entire process of turning barley into malt. It is now relegated to the malthouse, and is ready for market.

A constant war is waged against weevils, and, if any are found in grain that is taken in, they are completely removed in the process of cleaning, and the bags in which they are collected are dipped in a tank of boiling water.

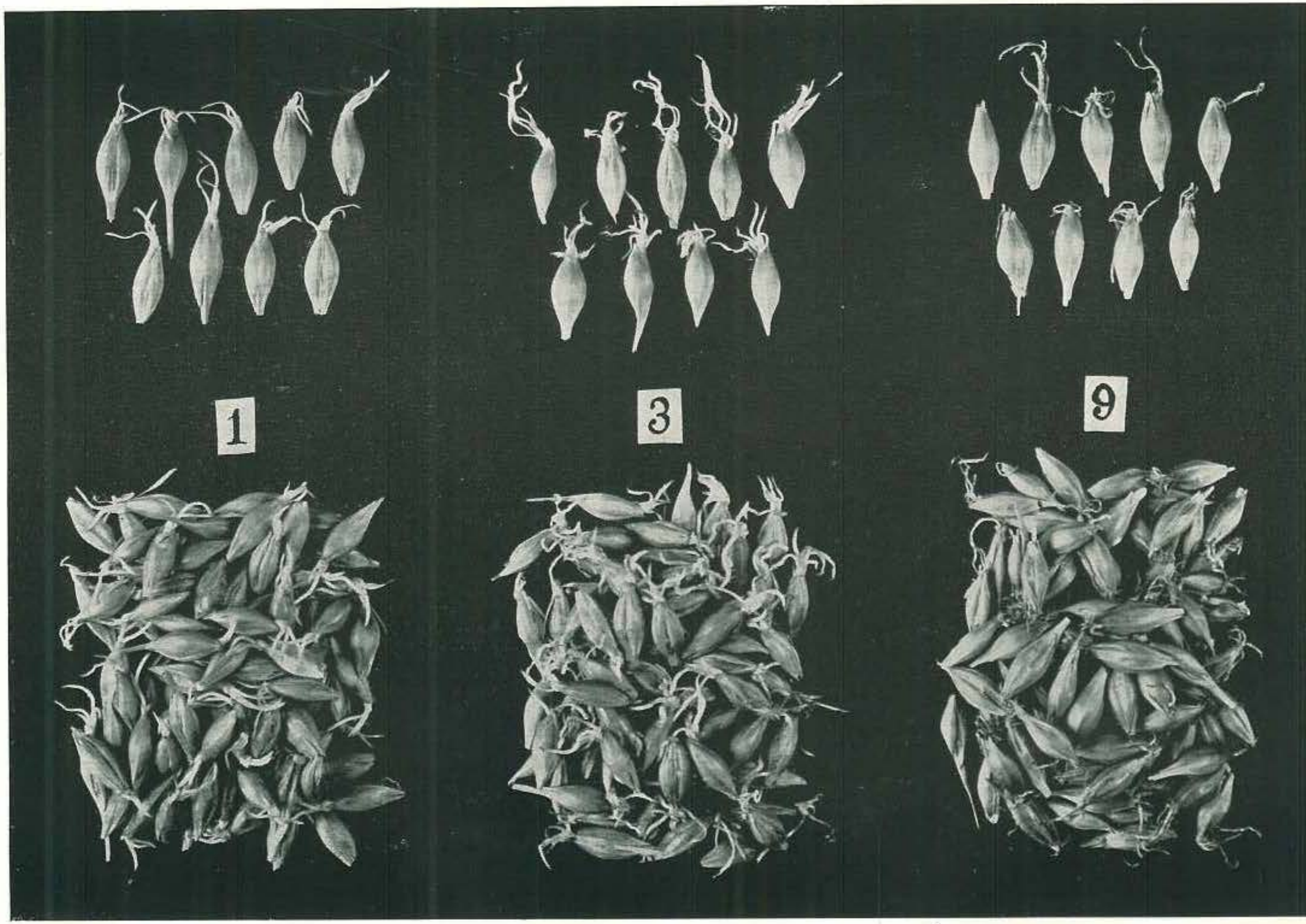
Black malt, which is used in the brewing of stout and porter, is also made at the Black Gully maltings.

Plate XVI.



1. Germinating Floor. 2. General View of Interior.

Plate XVII.



Malt in Various Stages.

The screenings produced in so large an establishment are a considerable item, but Mr. Redwood turns them into good account in fattening pigs. There are two machines for dealing with screenings, a rolling machine and a crusher. Rolled barley is an excellent grain feed for horses. The ground grain is fed to the pigs.

It will be seen from the foregoing that the making of malt demands scientific knowledge, the most watchful care, and the most ingenious machinery. Needless to say that a malting-house entails considerable expense both in erecting and working, and considerable capital for the purchase of barley. The value of Mr. Redwood's house and plant considerably exceeds £12,000, and is constantly being added to. This is exclusive of stock, movables, &c. A considerable number of hands is required, and the weekly cost of working runs into about £120, the men being paid according to the work they perform, from 35s. to 50s. per week.

The annual requirements of barley for the State amount to 200,000 bushels, which, at an average yield of 20 bushels per acre, would represent the produce of 10,000 acres. Mr. Redwood can handle about 100,000 bushels.

Queensland malting is carried on in the centre of the barley districts, and imported grain has to be railed from Brisbane to Toowoomba and Warwick, a distance of from 100 to 160 miles respectively. It is, therefore, remarkable that Queensland farmers do not produce the whole of the barley required by the maltsters. The demand for malt absorbs about 200,000 bushels; and, as 1 bushel of barley makes 1 bushel of malt, it would be easy for the farmers to supply all Queensland requirements, after which an outside market would have to be looked for.

The average production of beer in Queensland is over 4,000,000 gallons, which require about 190,000 bushels of malt, and, if the maltsters and farmers could meet each other in the matter of quality and price, there is no reason why any malt should be imported.

Such constant skilled oversight being essential in this industry, Mr. Redwood is fortunate in having the co-operation and assistance of his father, Mr. Chas. Redwood, and his brothers, Messrs. C. E., Leo, and Joseph Redwood, who have all special knowledge of the work, and divide the various duties, such as day and night supervision of the floors, general business, buying, and mechanical work.

The illustrations on Plate XVII. show clearly the process of germination of the grain. No. 1 represents green malt three days on the malting floor. No. 3 shows the appearance of the grain after six days, and in No. 9 it is shown in the withering stage. The pictures were taken by Mr. H. W. Mobsby, artist to the Department of Agriculture.

WHEAT ON THE MARANOA.

A sample of wheat has been brought to this office by Mr. H. B. Watson, which was cut at Mount Abundance by Mr. J. Fraser, chief engineer of railways at Roma. The wheat is over 4 feet 6 inches in height, with large, well-formed ears 6 inches long, which promise a heavy yield, and was grown from the South Australian seed purchased by the Department of Agriculture for distribution to the farmers. It is a general sample of 1,200 acres of the same variety. We regret that we cannot give the name of the wheat, but will supply it in our next issue.

Dairying.

THE INFLUENCE OF CLEAN-SKIMMING ON THE YIELD OF BUTTER.

[Translated from the Swedish by F. Witting, Graduate, Alnarp Agricultural College, Sweden.]

Some time ago the agricultural journals of Sweden published a discussion between dairymen on the influence of clean-skimming on the yield of butter, and the opinion was then expressed that the smallest fat-grains or globules would escape the formation of butter and remain in the butter-milk. It was, therefore, of no use, so it was said, to carry the clean-skimming too far. Against this it was remarked that the amount of butter-fat in the butter-milk, at factories where clean-skimming is carried to its highest degree, should be higher than has proved to be the case in practice. A lowering of the amount of butter-fat in the skim-milk with, let us say, ·05 per cent., should, under the proposition that this fat remained in the butter-milk, raise the amount of butter-fat in the butter-milk by about ·4 to ·3 per cent., a circumstance which should have been noticed from the carefully testings of butter-milk carried out during the official grading of butter, &c., by Government experts. However, the possibility remains that at least a part, if not all, of this fat may remain in the butter-milk, and thus escape notice.

Which of these statements is the case can only be ascertained by carefully done comparative trials of skimming and churning.

In order to investigate the question, experiments were carried out at the Alnarp Agricultural College and Dairy University by Dr. L. F. Rosengren.

The skimming was done by an Alpha Laval separator (Alpha-Daisy), and the churning in a concussion churn or centenary churn, both driven by steam-power (belt).

By means of altering the temperature at the time of skimming and noting the quantity of milk put through, the amount of butter-fat in the skim-milk varied between ·05 to ·265 per cent.

To each one of the series *a* and *b* in each trial there were used exactly 100 kilos of whole milk. An up-to-date scale with "taré systeme" was used in the taking of this sample, so as to get exact measures. The differences in the cream per cent. in each trial were equalised by diluting the thicker cream with its own skim-milk, so that in both series, in each trial, the amount of cream was the same. The temperature at the artificial ripening of the cream, the quantity of lactic ferment used, the amount of washing water used, and the temperature at the churning varied somewhat in the different trials, but in both series in the same trial it was the same, of course. Too high a temperature at churning was the cause of the less satisfactory result from some of the churnings. The churnings were done in a concussion churn because this sort of churn, so to say, washes itself, and thus the danger that some of the cream, through splashing, might escape treatment is fully removed. When fairly firm, the butter was worked on an ordinary worker, thereafter weighed, and samples taken before the salting. The testings of the fat were done according to Gottlieb's system. The results are compiled in the table.

If there should be any foundation for the suggestion that the smaller fat-globules remain in the butter-milk, and this, therefore, be the fatter, the further the clean-skimming is carried on, then trials with very high clean-skimming ought to be specially convincing in this case. In several of the trials in one series the clean-skimming was, therefore, carried on so far that the skim-milk only contained ·05 per cent. of fat, or a little more, while in the other series the amount of butter-fat was successively raised from ·09 per cent. to ·265 per cent.

It has hereby been ascertained that, no doubt, at a higher clean-skimming, as a rule, more fat remains in the butter-milk, but that this fat amounts to almost nil compared with the fat which goes into the butter.

TABLE.

Trial No.	100 kg. Whole Milk à kg. Butter Fat.	Skim Milk.					Butter Milk.							Butter.				Difference per 100 kg., Whole Milk.	
					Difference in Fat.		Series A.			Series B.				Series A.		Series B.			
		Kg.	Series A. Fat, per Cent.	Series B. Fat, per Cent.	Per Cent.	Gramm.	Kg.	Fat, per Cent.	Fat per 100 kg. Whole Milk, Gramm.	Kg.	Fat, per Cent.	Fat per 100 kg. Whole Milk, Gramm.	Difference, Fat, Gramm.	Kg.	Water, per Cent.	Kg.	Water, per Cent.	Butter, Gramm.	Butter Fat, Gramm.
1	3·11	89·6	0·06	0·09	0·03	26·9	8·068	0·82	66·1	8·138	0·73	59·4	6·7	3·352	13·3	3·462	13·3	70	20·2
2	3·15	89·5	0·055	0·09	0·035	31·3	8·179	0·78	63·7	8·234	0·71	58·4	5·3	3·521	13·3	3·446	13·3	55	26·0
3	3·30	89·6	0·07	0·11	0·04	35·3	7·777	0·65	50·5	7·841	0·52	40·7	9·8	3·823	13·4	3·759	13·2	64	26·0
4	2·99	90·3	0·08	0·14	0·06	54·1	7·400	0·57	42·1	7·444	0·52	38·7	3·4	3·500	13·7	3·456	13·9	44	50·7
5	4·16	90·2	0·06	0·13	0·07	63·1	6·565	1·08	70·9	6·242	1·07	66·7	4·2	4·835	13·6	4·758	13·4	77	58·9
6	2·93	91·1	0·15	0·225	0·075	68·3	7·237	0·59	42·6	7·285	0·46	33·5	9·1	3·263	13·8	3·215	14·0	48	59·2
7	3·22	88·8	0·055	0·14	0·085	75·4	9·172	0·73	66·9	9·243	0·63	58·3	8·6	3·628	13·6	3·557	13·7	71	66·8
8	3·53	88·9	0·055	0·14	0·085	75·5	8·163	1·26	102·8	8·226	0·95	78·1	24·7	4·137	14·0	4·074	14·0	63	50·8
9	3·20	89·7	0·06	0·165	0·105	94·1	7·650	0·76	58·1	7·799	0·52	40·5	17·6	3·750	13·8	3·601	13·4	149	76·5
10	2·92	91·2	0·16	0·26	0·10	91·5	7·077	0·55	38·9	7·206	0·44	31·7	7·2	3·323	13·9	3·194	13·9	129	84·0
11	3·03	91·4	0·02	0·235	0·115	105·1	6·810	0·59	40·1	6·904	0·57	39·3	0·8	3·390	13·9	3·296	13·6	94	104·3
12	3·09	88·3	0·05	0·17	0·112	106·0	9·348	0·51	47·6	9·437	0·45	42·5	5·1	3·552	13·6	3·463	13·7	89	100·9
13	3·36	90·9	0·105	0·25	0·145	131·8	6·895	1·30	89·6	7·036	0·83	58·3	31·3	3·805	13·8	3·664	14·1	141	100·5
14	2·96	86·8	0·08	0·23	0·15	130·2	11·128	1·1	122·4	11·258	0·93	104·6	17·8	3·272	14·2	3·142	14·2	130	112·4
15	3·14	89·6	0·065	0·22	0·155	138·8	7·947	1·66	131·9	7·104	1·30	92·3	39·6	3·653	14·5	3·493	14·1	160	99·2
16	3·13	89·8	0·06	0·265	0·205	184·0	7·714	0·77	59·3	7·925	0·74	58·6	0·7	3·686	14·2	3·475	14·3	211	183·3
Average ...		89·8	...	...	0·0984	88·3	...	...	68·3	...	...	56·3	12·0	...	13·7	...	13·7	99·6	76·3

We see *that of* 88·3 *grammes of fat*, the amount by which the amount of butter-fat in the cream in series *a* per 100 kg. as an average exceeds the amount of butter-fat in the cream of series *b*, 12 *grammes of fat remained in the butter-milk, while* 76·3 *grammes are to be found in the butter, and that, at a lowering of the amount of butter-fat in the skim-milk in the series a with* ·0984 *per cent., we have got, as an average, an increase in the yield of butter in the same series of* 99·6 *grammes per* 100 *kgs.*

The variations in the relation between the butter differences and the butter-fat differences depend upon unavoidable losses in the manipulation of the cream and the butter. The "butter differences" are facts gained by weighing. The "butter-fat differences" are obtained from deduction of the quantity of fat by which the butter-milk in series *a* exceeds the quantity of fat in series *b* (per 100 kgs. of whole milk) from the amount of fat with which the skim-milk in series *b* exceeds the skim-milk in series *a* per 100 kgs. of whole-milk. The differences in the fat in the butter-milk vary also a great deal in the various trials. This may depend upon the temperature at the time of churning or other circumstances.

Seen from a practical point of view, however, it can be said, with regard to the influence of the skimming on the yield of butter, that, calculated on 100 kgs. of whole milk, for every ·01 per cent. wherewith the amount of fat in the skim-milk is lowered, the yield of butter is increased by 10 kgs., even if the clean-skimming is carried so far that the skim-milk only contains ·05 per cent. From these trials no striking differences in the churning results can be seen, no matter if the fat in the skim-milk lies between ·15 to ·25 per cent. or between ·15 to ·05 per cent. For a factory with a daily milk supply of 10,000 kgs. the yield of butter would therefore increase by 365 kgs. per annum for every ·01 per cent. lowering in the amount of butter-fat in the skim-milk.

SOME ESSENTIALS OF SUCCESSFUL DAIRYING.

The following excellent paper on this subject by Professor C. G. Freer Thonger, M.R.A.C., F.C.S., although written for English dairymen, will equally well apply (except in the matter of seasons) to those in that line of rural business all over Australia. We take the text from the *Journal of the Bath and West and Southern Counties Society*:—

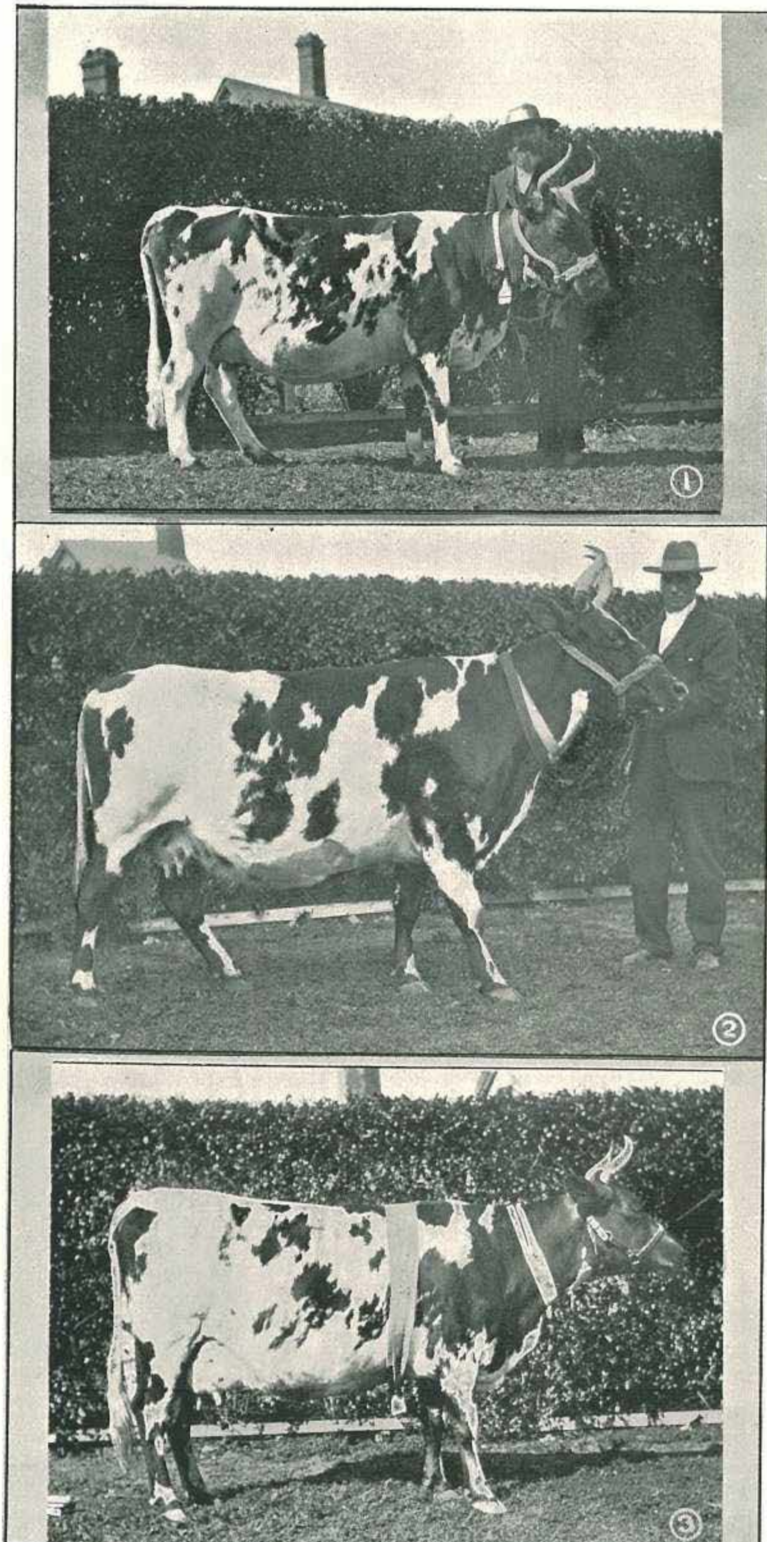
The Dairymen.

The most important factor in dairying is the dairyman. If he possesses the qualifications necessary to make the business a success, he will see that the other essentials are not wanting. He should have a good business education, be careful and methodical in his habits, with a determination to do everything pertaining to his work to the best of his ability. He should be not only capable but thoroughly in earnest, and should take an interest in and appreciate every individual cow that is in his charge. Unless he sees clearly the necessity of kindness, good warm housing, pure drinking water, knowledge of suitable feeding mixtures, cleanliness in every particular, and is willing to devote time to weighing, testing, and recording the yield of his cows, it would be better for him not to attempt dairying, for it is extremely improbable that it will prove a paying business.

The successful dairyman of to-day is a very different man to the dairyman of the past. He does not imagine that he knows everything, and he is ever on the look-out for fresh ideas.

Dairymen may be divided into three classes: First, there are the workers who, by every means in their power, are striving to make the finest and best goods, and who are never content but are incessantly trying to do better. This class of worker is anxious and willing to learn from every one and any one. Such a man will tell you that the more he knows about his work the more he wants to know, and the more he realises his own ignorance.

Plate XVIII.



College Cattle at Bowen Park.

1. Annie Laurie. 2. Lavinia. 3. Laverock.

The next class includes those who seem to think that if they only make butter and cheese that will, "by hook or crook," pass the inspection of the buyer, they have done well enough and have reached the top of the ladder. Some day they will wake up and find that they have been left behind in the race, and they will wonder why it is so, and blame everybody but themselves. If you criticise their product and try to bring home to them the fact that the fault is with themselves, they will tell you that their butter and cheese sell at market price, which is sufficient for them. But they forget or ignore the fact that, if their produce were equal to the best, the price they would then get would be correspondingly higher. They do not seem to realise that there is a wide range in quality from the finest down to the point where the weeding-out commences.

Few words need be used to describe the third class of workers. It consists of those who, utterly ignorant and shiftless, do not seem to care what the result of their labour will be. You may know them by their work and surroundings before you see them.

A man or woman must possess no ordinary amount of ability and intelligence to become a first-class butter and cheese maker, and those who are so may well feel proud of their position. While there are scores of makers who can never attain to this, there are many others who, if they would only wake up and get abreast of the times, would soon be in advance of the majority.

The Dairy Cow.

The best dairy cow is that which will produce the greatest amount of milk of good quality from a given quantity of food. The difficulty is, to decide what cow most nearly conforms to this definition. It is, however, certain that an approach to this ideal cow can be found in every breed.

In breeding, there are three chief factors—selection, heredity, and environment Selection means the choosing of animals approaching, as nearly as possible, to the type we wish to produce. Heredity is the tendency which all organic things have to resemble ancestors. Broadly taken, it includes atavism—the throwing back or reversion to ancestors more or less remote—and prepotency, or the ability to transmit certain characteristics to the offspring. This latter is the power of some individuals especially, and is, probably, greatly strengthened by in-breeding, and by long breeding upon certain lines. The great foundation Shorthorn bull Favourite is an oft-quoted example of an animal possessing this power to a remarkable degree.

Men have long recognised the influence of selection and heredity; but since Darwin pointed out the power which animals and plants have of adapting themselves to the conditions which surround them, we have come to realise much more the part played by environment.

Environment means general surroundings, kind and quantity of food climate, and, in fact, the daily life of the animal. Hence the future of the calf depends very much upon the treatment it receives for the first two years of its life.

In Nature's breeding, environment has done almost everything. The primitive horse, which went down into the low marshy country of the lower Rhine, where he never lacked food, and there was no struggle for existence, after many centuries, became the powerful, big-footed, large-boned Flemish horse. The primitive horse, which went to Western Asia, where the climate was dry and food not too plentiful, and where everything demanded a different type of animal, became, as the result of its environment, the small, active, swift, and hot-blooded Arab.

The Dutch cow, since the time of the Roman Conquest, has dwelt in the Friesland marshes, the most luxuriant in the world. There, where water was always close at hand, where, to get her food, she need hardly move about, when she took a bite of grass she got a whole mouthful, she fitted herself to her environment. Food was abundant, so she grew big; her bone, as she had no hills to climb, became fine, and she never had to "rustle" for her living. So she is, to this day, a big, ease-loving, sleepy cow, capable, under suitable conditions, of wonderful results.

It is difficult for anyone to entirely avoid partisanship in breeds. Perhaps it is best for a man to choose the breed which he fancies; but it is folly to expect success with any breed, unless, to some extent, the same conditions as those under which it has been developed are provided. We must seek after the cow that will give us the greatest amount of rich milk from a given amount of food, and most of us would retain any cow that, with good care, would give 300 lb. of butter per year. Some of these may be found among all breeds.

With the beef breeds we are not concerned. This is a day of specialisation, and there is something incompatible between a thick loin and a thigh, together with the ability to lay on fat at an early age and the capability to give milk largely and persistently. To attempt to combine these is as fallacious as to try and combine the thoroughbred and the Shire horse. The dairy cow is a wonderful production in her way, and her breeding and management and the manufacture of her produce represent one of the highest phases of agriculture.

The purchasing of cows in the open market is, as we have frequently pointed out, a decidedly unsatisfactory business; but, as a large number of renewals of the herd are obtained in this manner, the points which the dairy cow should possess may now be considered.

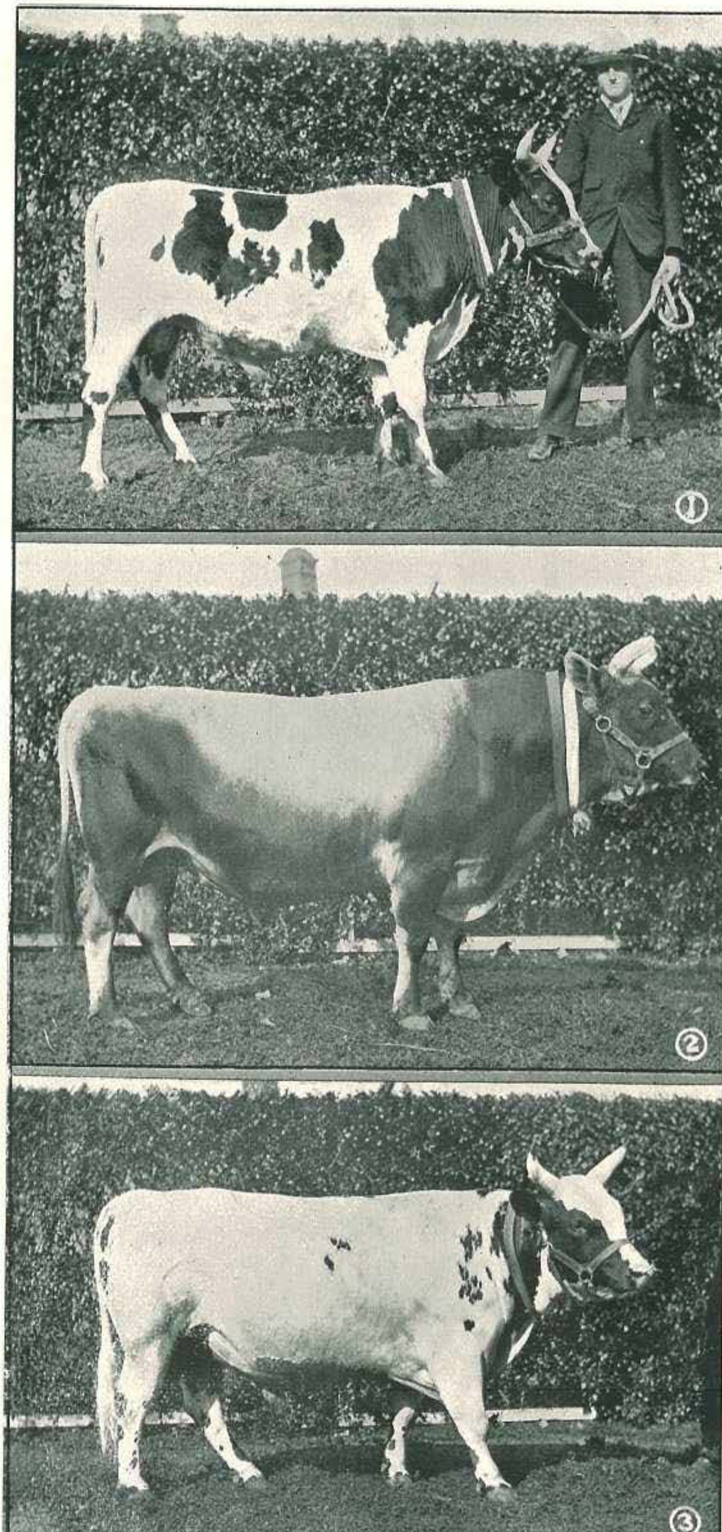
Many persons, who claim to have a pretty good idea of what a dairy cow should be, still adhere to the old notion that it should be deep in the flanks and wedge-shaped, increasing in depth and width backwards. So far as mature cows are concerned, there may be something in this, if we add depth of udder; but we have to consider points that are applicable to the young calf, the undeveloped heifer, and the sire as well.

Many cows lack depth of flank, nor are all heifers of great promise and bulls noted as great sires specially remarkable for deep flanks; indeed, the reverse is generally the case. A deep flank is generally accompanied by a level or straight bottom line, so desirable in beef animals; but a promising dairy youngster is invariably deep in the middle, with the bottom line from the middle running upwards to the brisket and towards the flank, which shows good depth through the middle of the body, but the reverse behind the shoulders and in front of the hips. Putting aside all immaterial points, we have two things to consider. First, what disposition will the animal make of its food? And second, how much food will it consume in a day? Its angularity or tendency to smoothness will decide the first point, and its depth of middle the second. Having these two points settled, it matters little whether she gives much or little milk. For if she does not convert food into meat she must convert it into milk. If she gives little milk, she will make up in a larger percentage of fat and other solids what is lacking in quantity. If she gives a large flow, it simply means that she assimilates more water with her milk, and yields a smaller percentage of fat and other solids.

With regard to the second point, if we take two cows similarly built as to angularity, except that one shows greater depth through the middle than the other, both being about the same size, they will require an equal amount of food for support—say, 8 lb. of digestible, nutritive matter. The deep cow will eat and digest 16 lb. of digestible nutritives, using 8 lb. as food for support, and 8 lb. for conversion into dairy products. In other words, you have a half interest in all the food she eats; you are an equal partner in the business. The cow that lacks depth through the middle will eat about 12 lb. of digestible nutritives per day, using 8 lb. for herself as food for support, and 4 lb. she converts into dairy products, in which case you have only a third interest in the food she takes. That is the reason why some cows lacking digestive capacity, but having otherwise good dairy points, give such a poor return in the dairy.

The disposition an animal will make of the food it takes is mainly a question of temperament. Animals, as well as men, are domesticated by different

Plate XIX.



College Cattle at Bowen Park.

1. Patsey. 2. Chieftain VIII. 3. Scotch Jock.

temperaments, and vary in form or type accordingly; consequently, type is the index of temperament. In the hound, hunter, thoroughbred, &c., the motor or muscular system, having the mastery, absorbs the bulk of the nutritive material in their food. In this class of animal there is always a large network of veins, running over and through the muscles, to carry the nutritive matter absorbed by the blood to these parts. Whether it be the pig, the compact, blocky bullock, or the mutton sheep, the vital temperament holds sway, and the nutritives in the food are converted into flesh. With the dairy cow, the function of motherhood is the chief object in life, and this is accomplished through the most wonderful of all systems—the nervous. Conception itself is the result of nervous action, and, though shrouded in mystery, the fact that gestation and motherhood are mainly the result of nervous action is clearly demonstrated through the whole period of lactation. The more highly developed the nervous system, the greater the activity of the lacteal functions, and the greater the flow of blood to the udder. The udders of great milkers are always covered with a correspondingly large network of veins, and the two veins running forward from the udder in such cows are of a size to accommodate the large flow of blood from the udder. The more closely we examine this intricate problem, the more clearly do we see that temperament really controls the disposition of the nutritive material taken up by the blood; and since type is simply an index of temperament, we must train ourselves to a better study of animal physiology.

Care of the Cows.

Cultivate the acquaintance of your cows, treat them kindly, and teach them to regard you as their best friend; cows love kind treatment, and we may rest assured that it will pay. In making the change from winter feeding to pasture, great care should be used. Do not be in too great a hurry to get the cows out to grass; wait until the grass gets a fair start, and the ground becomes warmed up, so that the cows will not be chilled when lying down. Garget and other udder troubles are often traceable to this cause. Keep up the winter feeding for some time, reducing it gradually as the grass improves, and the cows will not then have the half-starved appearance they frequently have at this season. It will pay to give the cows a "bait" when brought up for milking, as they will then be near at hand, which will save time in driving them up. When the grass begins to fail have ready on hand some green maize, cabbages, vetches, or something extra to keep up the flow of milk. Keep salt always within their reach, and provide abundance of pure water. If butter-making be followed, make a good quantity in winter; for, with cows well taken care of, and with a good dairyman at the head of affairs, it will pay well. Have a number of cows fresh in the autumn, being very careful, as soon as the nights become chilly and during cold rains, to house them, for cold cows and success do not go together. As soon as frost and snow set in, keep them in all the time, except on warm, sunshiny days, when they can be let out for a few hours without any harm. Grow plenty of roots, and have a good supply of bran, cake, maizemeal, and ground oats. These, with well-made, early-cut hay, will provide a good range of milk-producing foods.* Feed liberally, but not blindly. Note the capacity of each cow, and feed accordingly, for some will be found able to pay better for feeding than others. In order to ascertain this, weigh each cow's produce, then, by calculating what the food costs, it is a very easy matter to know whether you are feeding at a profit or a loss. This may be some little trouble, but it is the only sure way. It will tell us the quantity of milk the cow gives; while, in order to ascertain the quality, the milk of each animal should be tested at least once a month, or, better, every fortnight. Do not depend upon the amount of butter obtained from a certain quantity of milk, for you may lose a considerable percentage of butter-fat in creaming and churning, and so condemn the cow wrongfully. If, after a fair trial, you find you have cows that do not pay, sell them, and the sooner the better.

* It is remarkable that no mention is here made o ensilage.—Ed. *Q.A.J.*

Keep the houses clean and the cows well bedded; brush them every day, and do not allow a particle of manure to be left on them. Milk them at regular times, and let each milker milk the same cows each time. The cows should be carefully brushed before milking, and the hands of the milker kept perfectly dry during the process. Allow no loud talking or other noise during milking time. Cows coming fresh in the autumn and well fed will give a good flow of milk all winter, and on getting out to grass in spring will give nearly as much as though fresh in the month of March.

HANDLING THE PRODUCE.

Although this part of the subject comes last, it is by no means of least importance; indeed, upon it hinges the financial success of the dairyman's business. A good deal depends on how you dispose of your produce; but whether engaged in either the retail milk trade, cheese manufacture, or butter-making, offer nothing for sale unless it be of the best. If butter is made, use tin pails for milking, and be very careful to thoroughly scald and clean them. Do not let them stand in the cow-house after being filled, but carry them to the dairy at once. Strain the milk into the setting-pan or separator. Keep the cream-holder in a cool place, and stir up every time you add fresh cream. When you have sufficient to churn, or, at least, every three days, place the cream-holder in a warm room, and stir occasionally, so that its contents may ripen evenly. As soon as the cream assumes a thickened, velvety appearance, it is ready to churn, and should be churned in summer at from 50 degrees to 60 degrees Fahr., and in winter at from 63 degrees to 65 degrees Fahr. Do not fill your churn too full; one-third full is about right. Turn at about 45 revolutions a minute, not forgetting to ventilate the churn a few times when commencing. If everything is all right, in about thirty minutes the glass will become clear. Then churn slowly until the granules of butter are distinct and about the size of wheat-kernels. Add cold water so that the granules will harden slightly, and then draw off the butter-milk. Wash until the water runs from the churn perfectly clean. Salt with the best salt to be obtained, and to suit the taste of your market; make up the butter into neat packages, wrapping each one in a sheet of parchment paper. If the above directions are carried out, you will seldom have any trouble with unruly churnings, and will have an article which will always sell, and at a good price.

A COMMON ERROR IN MILK-TESTING.

Mr. F. Thompson, of Rangiwahi, New Zealand, writes as follows to the *New Zealand Farmer*:—

I wish to bring before the public a very important matter concerning the welfare of the dairying industry. There has been a good deal of discussion, from time to time, as to the correct overrun which should be obtained in the manufacture of butter. My object is not to deal specifically with this question, although I would like to hear the opinions of your readers on the subject. Personally, I think that when more than 12 per cent. is shown, there is something wrong with the works—that is, if we are to keep the quality of our article up to a high standard. I do not wish you to infer from this that there must necessarily be some underhand work going on, on the part of the operator of the Babcock, or the man in charge of the scales, for it is impossible to increase or lower the ratio of butter to butter-fat without resorting to some such means. The fluctuations in the percentage of fat shown by the Babcock is brought about by the same cause to a great extent, as I will endeavour to show you.

Did it ever strike you that we factory managers, directors, and proprietors of butter factories have been labouring under a delusion all these years by the past and present universal method of taking the composite sample. It is to this that I wish to draw the attention of your readers. I will show that the factories in New Zealand, and, so far as I am able to ascertain, in other countries as well, are altogether wrong, and are working in a very slip-shod manner with regard to the taking of the samples for testing.

It is an everyday occurrence for a supplier to bring more milk than the weigh can will hold at once, which necessitates the man in charge of the scales weighing twice or even three times. Under the present method of taking the sample, the ounce dipper is used, or it may be a drip sample—it matters not. The sample is taken and put into some receptacle from each weighing.

Example:—First weighing, 100 lb. of milk at 6 per cent., gives 6 lb. of butter-fat. We will assume that 1 oz. is taken from this. Second weighing, 100 lb. at 6 per cent., with 100 lb. of water added, thereby reducing the percentage of fat of the second weighing of 200 lb. to 3 per cent. One ounce is also taken from this, and from these 2 oz. the sample is taken and put into the bottle. Then, as each of the 100 lb. at 6 per cent., gives a total of 12 lb. of fat, the 300 lb. at 4·5 per cent., which is the average of 6 per cent. and 3 per cent., gives a total of 13½ lb. of fat, or a direct gain to the milk supplied by the addition of 100 lb. of water, of 1½ lb. of fat, in addition to the usual allowance of skim-milk, and which the other suppliers have to suffer for.

These figures were used for easy calculation, but let any of your readers work out any actual case, and they will find it will tally only to a greater or lesser degree. In the example I have given 1 oz. only was taken from the 3 per cent. weighing when 2 should have been obtained, for there was twice the quantity of 3 per cent. milk. These samples, too, must be taken to a drop, to ensure an accurate proportionate sample, which cannot be done. Under the existing method, therefore, it is quite outside the bounds of possibility to work on straight lines.

A patent has been applied for, which will do away with this existing state of affairs. It will safeguard the companies and suppliers, and enable the manager to have a more uniform overrun, as well as to show more uniform tests, which will be, without question, a boon to factory managers, and enable them to say "Good morning" with impunity to the suppliers, even on the day following the testing.

MILK TESTS AT THE NATIONAL AGRICULTURAL AND INDUSTRIAL ASSOCIATION'S SHOW.

12th and 13th August, 1903.

FIRST DAY.

	Owner.	Name of Cow.	Lb. of Milk.	Per Cent. of Butter Fat.	Lb. Commercial Butter.
Morning.	Messers. Gorrie and Franklin	Daisy	23	2·6	·67
	Mr. A. Waters	Plum	17¾	3·0	·59
	Mr. J. Carr	Nellie	21½	3·2	·77
	Mr. J. Carmichael ...	Gentle	18½	3·4	·70
	Messrs. McCook Bros. ...	Queenie	16	4·8	·86
	Agricultural College ...	Stumpy	21¾	3·8	·92
Evening.	Messrs. Gorrie and Franklin	Daisy	21¼	5·2	1·23
	Mr. A. Waters	Plum	12½	3·9	·54
	Mr. J. Carr	Nellie	16	6·3	1·12
	Mr. J. Carmichael ...	Gentle	15½	5·0	·86
	Messrs. McCook Bros. ...	Queenie	11¾	5·5	·72
	Agricultural College ...	Stumpy	16¾	4·8	·87

	Daisy.	Plum.	Nellie.	Gentle.	Queenie.	Stumpy.
Morning	·67	·59	·77	·70	·86	·92
Evening	1·23	·54	1·12	·86	·72	·87
	1·90	1·13	1·89	1·56	1·5	1·79

SECOND DAY.

	Owner.	Name of Cow.	Lb. of Milk.	Per Cent. of Butter Fat.	Lb. Commercial Butter.
MORNING.	Messrs. Gorrie and Frankland	Daisy	$25\frac{3}{4}$	3·2	·92
	Mr. A. Waters	Plum	$15\frac{1}{2}$	3·0	·52
	Mr. J. Carr	Nellie	20	4·6	1·03
	Mr. J. Carmichael ...	Gentle	$20\frac{1}{2}$	3·6	·82
	Messrs. McCook Bros. ...	Queenie*			
	Agricultural College ...	Stumpy	$22\frac{1}{4}$	3·9	·97
EVENING.	Messrs. Gorrie and Franklin	Daisy	$16\frac{3}{4}$	4·2	·78
	Mr. A. Waters	Plum	$11\frac{3}{4}$	3·8	·50
	Mr. J. Carr	Nellie	$14\frac{1}{2}$	7·1	1·14
	Mr. J. Carmichael ...	Gentle	$14\frac{3}{4}$	4·6	·76
	Messrs. McCook Bros. ...	Queenie*			
	Agricultural College ...	Stumpy	$15\frac{3}{4}$	4·8	·84

	Daisy.	Plum.	Nellie.	Gentle.	Queenie.	Stumpy.
First Day	1·90	1·13	1·89	1·56	1·58	1·79
Second Day	1·70	1·02	2·17	1·58	...	1·81
	3·60	2·15	4·06	3·14	1·58	3·60

Class 136.—Largest quantity of butter-fat from first milking ... ... Stumpy 1st
" " " one milking ... ... Daisy 1st
Same conditions as Class 136 ... ... Stumpy 1st
Class 137.—Largest supply of milk in forty-eight hours ... ... Daisy 1st
Same condition as Class 137 ... ... Daisy 1st

* Withdrawn from contest.

THE INFLUENCE OF THE TEMPERATURE AT THE PASTEURISING ON TUBERCULOSIS BACTERIA IN MILK.

BY F. WITTING, GRADUATE OF THE ALNARP AGRICULTURAL COLLEGE, SWEDEN.

In the Danish law dealing with pasteurising, it has hitherto been fixed that skim-milk and butter-milk should be heated up to a temperature of at least 85 degrees Celsius before it is allowed to be used as food for animals. When the law was to be renewed last winter, it was suggested by the Danish Department of Agriculture that the fixed temperature should be lowered to 80 degrees Celsius. As this was a question of the greatest interest to everybody, the Swedish Department of Agriculture instructed Professor Svenssen, of the Royal Swedish Veterinary Institute, to undertake investigations in the matter, in order to ascertain to what temperature the milk must be raised to effect the destruction of the bacteria.

Professor Svensen has furnished a report to the Swedish Department of Agriculture, from which report we will extract a few points of an interesting nature :—In the introduction to the report, Professor Svenssen says that the great importance of the question has made scientific men undertake a variety of experiments which have given very different results. Some had found that a temperature of from 60 to 65 degrees Celsius was enough to destroy the bacteria, while others stated that from 80 to 90 degrees Celsius and even a momentary boiling (100 degrees Celsius) failed to kill the germs. Besides the time during which the milk was exposed to this temperature, there were also other circumstances at work. Thus, the milk from an udder heavily affected with tuberculosis very often changed its components to such an extent that it coagulated at a temperature of 70 degrees Celsius and above, but these coagula were bad conductors of heat, and were therefore capable of preventing the bacteria from destruction by heating. Even such tuberculous milk which did not coagulate could give different results.

If the milk was heated in an open vessel and immediately thereafter cooled, it was possible that the whole quantity had not been heated up to the same temperature. According to the theory of Professor Bang, there was probably formed a skin or protecting froth on the milk which saved some of the bacteria. Differences in the arrangement of the investigations and other circumstances, which had intervened, had, no doubt, in their way, caused the very different results obtained.

As the question could not be solved by ordinary laboratory experiments, it appeared that more correct results would be obtained from ordinary pasteurising, during which the interfering causes which had acted during the laboratory experiments would not be present. For this reason, Professor Svenssen was of the opinion that the results at which he arrived during this investigation ought to be reliable in practical dairywork.

These experiments were carried out in a locality belonging to the De-Laval Company, where a small-sized pasteuriser (manufactured by the Separator Company) had been fitted up. By continual and careful watching the temperature was kept at the desired point, with a slight fluctuation of less than ½ degree above or below. The pasteuriser used was constructed for a pasteurising capacity of 400 litres (1 litre = 1·760 pint) of milk per hour. In the experiments about 200 litres were used, which passed the apparatus in from twenty-eight to thirty minutes. Milk, which ran through before the apparatus had reached the desired temperature, was collected in a vessel and poured back again into the apparatus. After the first pasteurising, the quantity of milk remaining in the apparatus was measured, and, as the quantity was found to be 13 litres, it could be understood that the apparatus had contained 13 litres during the experiment. When 400 litres passed in sixty minutes it would be seen from the formula $400 : 60 = 13 : \times$ or $\frac{13 \times 60}{400} = 1{\cdot}95$ that every particle of milk was heated from ordinary cooling temperature to the desired temperature in less than two minutes.

Altogether five experiments were carried out—

1. From a nine-days-old very virulent cultivated colony of tuberculosis bacteria from cattle, half a gramme was taken (7¾ gr. Troy), which was reduced in a mortar with 101 cubic centimetres of water and strained through a linen cloth. Of this colony of tuberculosis bacteria, 1 cubic centimetre was taken to 2 litres of water, which, therefore, was equivalent to 100 cubic centimetres to 200 litres. From this last-mentioned mixture, which was so diluted that the water appeared perfectly clear, 1, 2, and 3 cubic centimetres, respectively, were injected into the abdominal cavity of three guinea pigs, which inoculation should serve as a control and guide for the determination of the influence that tuberculosis bacteria, not having been treated at the pasteurising temperature, had on the animal. The remaining 100 cubic centimetres of the first mixture of tuberculosis bacteria were mixed with 200 litres of skim-milk, and immediately thereafter passed through the pasteuriser and heated to about 80 degrees Celsius (highest 78 degrees, lowest 82 degrees). The milk was led directly from the pasteuriser on to a cooler, where it was cooled to about 20 degrees Celsius. From the cooled milk, which was left standing undisturbed for about one hour, samples were taken, by means of a pipette, from the bottom of the vessel which received the milk. Of these samples, 3 and 5 cubic centimetres, respectively, were injected into two guinea pigs. At a microscopical examination of the milk, great quantities of tuberculosis bacteria, and also other bacteria, were found. By means of sedimenting and centrifugaling the samples, the bacteria were collected; and, having been mixed with water, these were injected into three guinea-pigs with, respectively, 1, 2, and 3 cubic centimetres—into the first two interperitoneally, and into the third subcutaneously.

2. As in the first experiments, one half gramme of tuberculosis bacteria was mixed with 101 cubic centimetres of water, of which 100 cubic centimetres

were mixed with 200 litres of whole milk. The remaining 1 cubic centimetre was mixed with two litres of water. Of this mixture, 2 and 3 cubic centimetres, respectively, were injected into the abdominal cavity of two guinea pigs.

The milk, mixed with the bacteria, was pasteurised at 80 degrees Celsius (very carefully), and then immediately cooled down.

With a pipette, milk was taken from the bottom of the vessel and injected into a guinea pig.

The remainder of the milk was separated by the Alpha-Laval separator, and of the bowl-slime (separator slime) mixed with water 1 and 2 cubic centimetres, respectively, were injected interperitoneally into two guinea pigs. After the skim-milk had been standing undisturbed for about an hour, a sample was taken out and 1 cubic centimetre injected interperitoneally into a guinea pig. Of the cream also 2 cubic centimetres were injected into a pig.

3. In this experiment, also, 200 litres skim-milk were mixed with 100 cubic centimetres of tuberculosis bacteria. A control pig received, interperitoneally, 1 cubic centimetre of unheated bacteria in water of the same concentration as in the milk. The skim-milk, as in the other experiments, passed the pasteuriser, but at a temperature of only 75 degrees Celsius, and was then instantly cooled. The milk was separated, and a small quantity of the separator-slime was stirred up together with water to the condition of a milky, muddy fluid, out of which 1 cubic centimetre was interperitoneally injected into each one of two guinea pigs.

4. 100 cubic centimetres mixture of $\frac{1}{2}$-gramme tuberculosis bacteria were mixed with 200 litres of whey. A control guinea pig received unheated tuberculosis bacteria in water, in the manner similar to that adopted in the case of the aforementioned control animals. The whey was pasteurised at 80 degrees Celsius, cooled, and 1 cubic centimetre (taken from the bottom of the vessel) was injected into each one of two guinea pigs.

5. Some of the guinea pigs which had received injections during the foregoing experiments having died too early, either from unknown causes or from the influences of other bacteria (other than tuberculosis bacteria) which had been in the milk and had escaped death at a temperature of 80 and 75 degrees Celsius, yet another experiment was carried out, in which the milk was first rendered innocuous when injected into the abdominal cavity of the experimental animals. For this purpose, 200 litres of skim-milk were heated in a larger apparatus, where the heat by means of special arrangements was carried to very nearly 100 degrees Celsius, after which the milk was cooled. As in the foregoing experiments, after the tuberculosis bacteria had been added, a quantity of milk was poured into a sterilised bottle, and of this mixture 2 cubic centimetres were injected into the abdominal cavity of a guinea pig for control. The skim-milk passed the pasteuriser at a temperature of 80 degrees Celsius, and was then cooled instantly and thereafter centrifugaled. Of the separator-slime mixed with water, 1 cubic centimetre was injected into each one of two guinea pigs.

The material which was injected into both the control and the experiment animals was examined microscopically, and was always found to contain tuberculosis bacterià in great quantities, so that the negative results must go to prove that the tuberculosis bacteria were dead.

Professor Svenssen says in his report that the remark may be passed that the milk used at the experiments was not naturally of tuberculous nature, or, in other words, was not taken from a tuberculous udder. But, in order to obtain the conditions as naturally as possible, Professor Svenssen had, by the grinding of the bacteria in a mortar, and by straining them through fine and dense linen cloth, tried to get the bacteria uniformly distributed in the fluid. However, the microscopical examination showed that the bacteria, notwithstanding these precautions, were sometimes found in colonies of from 50 to 100. But, as they were destroyed at a temperature of 80 degrees Celsius, the experiments must be considered still more convincing.

To the report is added a table based on the experiments, from which it can be seen that of the eight control guinea pigs (three at the first, two at the second, and one at each one of the other experiments) which did not get heated tuberculosis bacteria, two at the first, one at the second, and that of the third experiment had died after nine, ten, five, and three days respectively—that is to say, within such a short time that tuberculosis had not had time to set in to such an extent as to be noticable. The remaining four control animals had died after fifteen, fourteen, sixteen, and twenty days respectively, and with every one of them, the short time notwithstanding, tuberculosis had set in and could be noticed.

Of the experimental animals proper, also, a number died at a rather early period, possibly as a result of their having been in low condition previous to the experiments, but chiefly by patogen (injurious to the guinea pigs) bacteria, which had not been destroyed by the heating, being present in the milk and whey. However, if a note was taken of the time it took control animals to become noticeably infected with tuberculosis, the results of the *post-mortem* examinations of the experiment animal, which lived the same length of time or longer than those, would be of importance. So, for instance, it was indicated in experiment No. 3, with pasteurising at 75 degrees Celsius, that that temperature was not sufficiently high to destroy the tuberculosis bacteria in that case. *All* the experiment animals were in this case affected with tuberculosis in different stages after, respectively, twelve, fourteen, and thirty-four days. Whether the circumstance that the tuberculosis bacteria in the milk used for the experiments were not sufficiently distributed in the fluid, as might have been the case in ordinary tuberculous milk, had had any influence, and whether a temperature of 75 degrees Celsius would be sufficient to destroy bacteria in ordinary tuberculous milk, Professor Svenssen did not like to say with certainty.

In experiment No. 4 the pasteurising of whey had not led to any result, as the two experiment animals died too early—after two days. In experiments Nos. 1 and 2 with pasteurising of skim-milk and whole milk at 80 degrees Celsius, it was found that the tuberculosis bacteria which were in the milk had not succeeded in producing tuberculosis in the experiment animals within the time that had been required in the case where both control and experiment animals had been given milk heated to 75 degrees Celsius.

Plainest and most convincing with regard to the influence of a temperature of 80 degrees Celsius is the experiment No. 5 with sterilised skim-milk to which were added tuberculosis bacteria, and which was pasteurised at a temperature of 80 degrees Celsius; for, in this case, in both of the experiment animals which had died—*i.e.*, had been killed after so long a time as fifty-three days—no traces of tuberculosis could be found.

With reference to the question, whether a pasteurising at 80 degrees Celsius under all circumstances, and with the use of other kinds of pasteurisers, would be sufficient, Professor Svenssen was of the opinion that the time which was needed for the heating up of every particle of milk to a temperature of from 75 to 80 degrees Celsius must be the main thing. If for this process, as in these experiments, about two minutes were required, the pasteurising was, as far as the tuberculosis bacteria were concerned, to be considered as fully reliable.

According to a list compiled by Professor Svenssen on the working capacity in a number of pasteurisers (Swedish, Danish, and German makes), it will be seen that the milk is exposed to heating during 1·47, 1·26, 1·57, 1·76 minutes, respectively, in some of them.

Professor Svenssen sums up the results of the experiments in the following statements:—That from the experiments it could be seen that pasteurising of milk in some pasteurisers in which the milk was heated up quickly by means of having it in thin layers, and in which the time for the heating up of the milk was, about two minutes, the pasteurising temperature of 80 degrees Celsius was sufficient for destroying the tuberculosis bacteria, but that at a temperature of 75 degrees Celsius the same results had not been gained during the experiments.

The Horse.

THE OLDENBURG HORSE.

(Translated from the German "Informirende Mittheilungen," published by the Union of Breeders of the Stylish, Heavy, Coach Horse, Oldenburg.)

By A. J. BOYD.

Introduction.

At the international competition at the Paris Exhibition, in the year 1900, the Oldenburg coach horse, renowned for centuries, showed that he is worthy of his pristine renown. At the same time it was demonstrated that the intelligence of the breeders and of their organisation inspired confidence that certain existing imperfections have been promptly recognised and obviated, and that the improvement in breeding is the clearly recognised object of all their endeavours.

Although much has been written during the last few years on the Oldenburg horse, still a vivid description of the existing conditions of the breeding establishments of the coach horse and of their development in the last decade has been wanting. The following lines are intended to supply the deficiency; at the same time statistical and other such information, which are often only used as "padding," will be avoided, in order to give room for more lengthened discussion.

Nevertheless, the history of the Oldenburg coach horse cannot be passed over, nor, above all things, can the events in the realm of horse-breeding during the last decade be left out of consideration, if the leading idea is to throw light on the subject.

Historical.

According to chronological records, a considerable business in horse-breeding was carried on so far back as the fifteenth century in the marshes of the present Duchy of Oldenburg. These marshes, bordering on the Rivers Weser and Jade and on the Jeverland on the coast of the North Sea, constitute the most fertile districts of the Duchy of Oldenburg, and, together with the adjoining Geest districts which have many relations with the marsh country, is to the present day the cradle of the breeding of the graceful heavy coach horse. Seldom has there been seen such an uninterrupted course of breeding to one object for centuries, nor one which has been carried out with such determined energy as that of the Oldenburg coach horse. It is on this circumstance that the fact is based that the Oldenburg horse has inherited an unusually fine constitution and power of endurance. Even when mated with heterogeneous races, it is always certain to transmit its qualities to its progeny.

The first authentic accounts of the Oldenburg horse date from the fifteenth century. Already at that time the chronicler Hamelmann speaks of "Oldenburg's beautiful horses." It is further related—as Hoffmeister states in his work "Horse-breeding in the Duchy of Oldenburg, 1583 to 1884"—in a catalogue of horses presented by Duke John XVI. in the years 1583 to 1589, that this duke was an extensive breeder of pedigree horses prior to 1583. From these and other statements in the above-mentioned work, it is to be concluded that John XVI. was the first to introduce the breeding of pedigree horses on his estate, and that up to that time the country people only bred the native races, which the successor of John XVI., the celebrated Duke Anton Günther, exerted himself to improve. This duke was unquestionably the greatest breeder and expert in horses of his day; it is to be ascribed to his influence on the improvement of the horse-breeding industry of Oldenburg that the Oldenburg draught horse had already attained a reputation throughout the whole of Europe as a splendid breed.

The native horse of that period—large, broad, with powerful bone, and well set up—was greatly esteemed, and was frequently used for the improvement of other breeds. The horse-breeding industry of Oldenburg attained, under the rule of Duke Anton Günther, to universal expansion. The latter did not confine his endeavours for the increase and improvement of the studs to his private estates, but he strove to raise the standard of perfection in horse-breeding throughout the whole country.

Anton Günther, who possessed not only great experience, but also large means, did not, in his wise foresight, confine himself to external means for the fulfilment of his intentions, but he applied the lever to the right spot. He tried to increase and enlarge the understanding of the breeders on the subjects of the breeding, care, and treatment of horses. The sons of the farmers received regular instruction both in the handling of horses and in driving and riding them, and this not with the sole object of obtaining experienced men and good riders for the studs of the nobility, but also in order, by the practical education of the young men, to arouse in them an interest in horse-breeding.

Furthermore, suitable stallions were placed at the disposal of the country people, and the stock mares were also improved by the assignment to them of other good mares.

Anton Günther was most energetic in devising the improvement of sale conditions by the creation of horse markets, and also sought, at the same time, to spread the fame of the Oldenburg horse by making numerous presents of horses to princes and exalted noblemen.

These proceedings contributed in no small degree to bring it about that people far and near learned to appreciate the value of the Oldenburg horses, and to consider them indispensable to royal splendour. Thus, to quote only a few examples, we know that the Emperor Leopold I., after his marriage in the year 1658, rode into Vienna on a black Oldenburg charger, and the State carriage of the young Empress was drawn by six cream-coloured Oldenburg horses, presented to her by Duke Anton Günther.

The greatest authority on horses of that time, the Duke of Newcastle, records, in connection with his meeting with Queen Christina of Sweden at Antwerp, that besides her insignificant-looking Swedish riding horses she had eight great carriage horses from the Duke of Oldenburg's stud. They were broad-breasted, broad in the hindquarters, upstanding, and well shaped as to neck and head. They were of a yellow-dun colour, with white manes and tails, and were more beautiful than any he had ever seen. She presented them to the King of Spain, a truly royal gift and one worthy of either side.

We learn further from J. J. Winkelmann, the historian of Duke Anthon Günther, that in the year 1653 Count Oldenburg, who was spending some time in London, presented, on his father the Duke's behalf, six beautiful dapple-grey horses to the Protector, Oliver Cromwell.

In the year 1672 King Christian V. of Denmark founded the so-called Krogdahler Stud at Esserum, with a white Oldenburg mare named "Jungfrau" (virgin). The progeny from this stud were not only admired for their white colour, but because they were the noblest, strongest, and most endowed with endurance of all horses raised in Denmark.

It may be here incidentally remarked that in the seventeenth century attractive colours and beautiful manes and tails appear to have been especially prized; for, as in the Danish stud, a mixture of spotted, striped, pearl-grey, and white animals appeared, so also we find in the Oldenburg breeding establishments of those days, besides brown and black, more especially white horses; also yellow horses, with black manes and tails, orange-coloured and pearl-grey as well.*

The charger of Duke Anton Günther was a renowned animal; it was the white mare "Kranich" (the Crane) with a wonderfully long mane and tail. To this day the mane, 7 ells long (14 feet), is shown in Oldenburg, and the tail, 9 ells long (18 feet), is preserved in Copenhagen.

*Notwithstanding this fancy for colour, it was clearly considered most important in those days in Oldenburg to lay great stress on a horse standing up well and possessing high action.

Unfortunately, with the death of Anton Günther a falling off in the ducal stud is to be noticed; fortunately during the more than sixty years' reign of the Duke, he had so impressed upon the country people the value and knowledge of the industry that horse-breeding in the country remained vigorous; nor did the fame of the Oldenburg horse suffer detraction in foreign countries.

The statement made by the well-known English breeder of hackneys, Sir Walter Gilbey, respecting the antiquity of hackney breeding and the value of the blood, may be applied to the breeding of the beautiful heavy Oldenburg coach horse:—

"If remoteness of ancestry be held proof of purity of blood in equine as in human families, the hackney must take precedence of the thoroughbred."

It is true that the pedigrees of the Oldenburg coach horse do not extend to the beginning of the eighteenth century, like those of some of the hackney families, but it can be proved that since the reign of Duke Anton Günther, consequently since 1603, a well-known business in horse-breeding was carried on in the Duchy of Oldenburg; and it must be ascribed to the late preparation of a corresponding stud register—not at all to a change in the direction of breeding—that the record cannot be traced by documentary evidence through pedigrees of corresponding antiquity.

THE INTRODUCTION OF STATE SELECTION OF STALLIONS.

Horse-breeding was only taken up again by the Government in the year 1780.

Unfortunately, the measures then taken came to an end in 1793, and in the same manner other measures, introduced by Duke Frederick Augustus for the improvement of horse-breeding, fell through. At the same time we may date from those years the finally successful introduction in the year 1820 of the selection of stallions, the awarding of prizes for the best stallions, and the determination of a minimum charge for service of stallions.

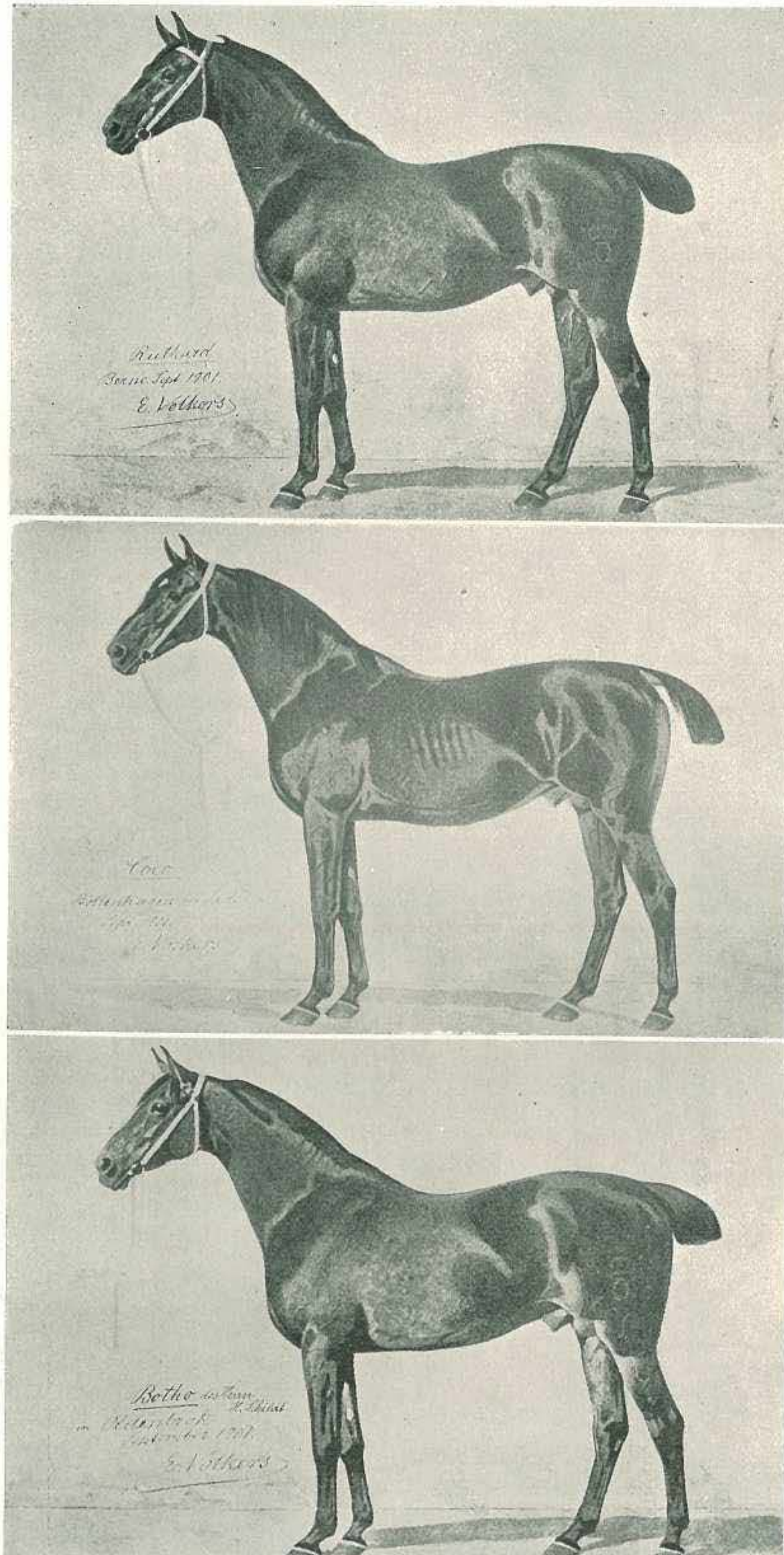
But not only was the selection of stallions thus kept in view, but the spread of the abuse of using two-year-old stallions was forbidden. The troubles arising from this law induced the Duke to make the law invalid, and to move the Ducal Chamber in Oldenburg to "elaborate a scheme for a general landholders' regulation for the improvement of horse-breeding in the Duchy." The death of the Duke in 1785, followed by the French Revolution with its consequences, prevented the carrying out of the measures proposed to be taken for the improvement of the country horse-breeding industry.

It was only in the year 1819 that the interrupted arrangements of the Government in 1785, respecting a general regulation for the improvement of horse-breeding, were again considered, by virtue of which the selection of stallions, combined with a premium to be awarded for the best animals, and the lowest limit for service were prescribed, and by which, once more, a far-reaching forward movement was made, and the hereditary interest of the Oldenburg landowners in horse-breeding was again aroused. For the season of 1820 arrangements were made for a selection, and for the following seasons every summer for succeeding years for the stallions appointed for covering, by a selection commission. The authority and the duties of this commission were, in course of years, more and more enlarged, and the duty, according to the law of 1861, of the commission was:—

1. Selection of stallions and revision of any reclamations of stallions;
2. Awarding of prizes for specially excellent stallions and mares;
3. The conducting of pedigree registers; and
4. The reporting of opinions asked for, and bringing up to the Government proposals having for object the advancement of horse-breeding.

The awarding of premiums to exceptionally good stallions since 1820 and to mares since 1840 proved to be an important means towards the improvement of the industry. At first 50 to 100 dollars (gold) and 50 to 75 dollars (gold) for the best stallions and best mares respectively were awarded; in course of

Plate XX.



1. Ruthard, No. 1256. 2. Coco, No. 1274. 3. Botho, No. 1354.

time these prizes were considerably increased, owing to the fact that the value of the animals had risen, and the best horses, in spite of the premium reverting to the State, were not seldom sold out of the country. [110 dollars courant or 100 dollars gold = 330 marks or £16 10s.]

Introduction of a State Stud-book.

The commission, in accordance with the determination of the above-noted law, undertook the compilation of a pedigree register. The entries, however, were so long in coming in that it required, in 1885, a renewed awakening of interest in the matter to set this most important question of registration going.

Foundation of the Oldenburg Coach-horse Breeders' Association.

Since in so important a breeding district as that of Oldenburg a single man can only work profitably if he has the support of his associates in the business, the promoter of the Oldenburg Stud-book endeavoured, with the co-operation of all horse-breeders in Oldenburg, and fully confiding in their practical view of questions on breeding, to give to his work a broad and firm foundation, and this confidence was splendidly justified.

Within about six months a large number of horse-breeders combined, under the title of "The Oldenburg Association of Coach-horse Breeders," with the object of bringing about, under Lübben's leadership, a comprehensive registration of animals suitable for breeding from. The newly formed association undertook to publish the future volumes of the Oldenburg Stud-book, and thus to contribute by letterpress and illustration to the further welfare of horse-breeding in Oldenburg.

In order to have at their disposal when receiving particulars of horses a complete controlling administration, confidential men were appointed for local districts, and as matters progressed others were appointed. These confidential men consulted under the guidance of a superintendent over the questions concerning the industry, and controlled the nominated animals. The registration of the latter was effected on production of certificates of service or on the affirmation of the owner, attested by the confidential agent of the district. Mistakes in filling up forms, or other mistakes which might occur, were rectified by the association secretary on revision. The records based on such a groundwork were of authentic value, and this was recognised without question in the different districts. The thirty years' experience with the State pedigree register taught the lesson that the goal was only to be reached by the road pointed out by the association, and the results proved that this road was the right one. Not only did members of the association enter their stallions and mares, but some 1,250 Oldenburg breeders did the same—a beginning which excited the highest anticipation.

The second volume of the Oldenburg Stud-book appeared in 1823. It surpassed in the contents and endowment all previous works in this department. An attempt to hinder the work of the association by the completion of the State pedigree register, and the disadvantageous creation of a register of ancestors combined with it, had no result. The material for a third volume of the Oldenburg Stud-book was collected, and would have been published had not the Government indicated decided changes in State arrangements.

Introduction of Compulsory Registration.

Thus there existed in the Duchy of Oldenburg two registers—that of the State and that of the private association. The result was, that often the certificates from the pedigree register and the stud-book differed in connection with the same animals, and thus many foreign buyers were led astray over the whole matter.

This state of affairs was bound to come to an end, and it was therefore thankfully acknowledged in the breeders' circles of Oldenburg when in the autum of 1896 the Grand Ducal Government presented to the then Diet the scheme which passed into law on 9th April, 1897, dealing with horse-breeding. The decreeing of this law is, without doubt, to be considered as the most significant turning point in the history of the beautiful heavy Oldenburg coach horse, for now, in addition to the compulsory selection of stallions which had existed since 1820, the compulsory registration of the whole of the female material answering to the breeders' standard in the combined districts after a general selection was introduced, and at the same time it was ordered that the female progeny of animals once entered were to be registered in the future without selection on their own folio and with their own number as soon as they were employed for breeding purposes. Thus the Oldenburg horse became by law, what he already was in fact, a special breed, which impressed his qualities with such certainty on his progeny that it is acknowledged that there is no longer any necessity for selection prior to registration in the register-book.

This legal recognition of the heavy coach horse as a special breed was the ripened fruit of a continuous compulsory selection of stallions for seventy-seven years, and of a regular business of breeding to an ideal dating still further back.

It may be imagined that serious scruples arose in breeding circles and in the Diet about the compulsory registration, yet its introduction was taken up generally by private traders in a manner never before known. The recognition that an uninterrupted registration could only be attained with safety in this manner, and that the aim of the whole industrial profit of the horse-breeding industry was in question, together with the circumstance that the full administration of their own affairs was guaranteed by law to the breeders, silenced all opposition.

Thus the breeders imposed compulsory registration on themselves with the assistance of the law, in order to be able to work powerfully together.

With the passing of the law in which the principles of the Oldenburg Coach-horse Breeders' Association were incorporated, the latter dissolved.

ASSOCIATION OF NORTHERN BREEDERS.

After the passing of the horse-breeding law, that portion of the Duchy of Oldenburg in which the raising of heavy coach horses had been carried on was named "The Northern Horse-breeding District." The breeders of this district united as jurists in an association of breeders of heavy coach horses, and to them was assigned the management of their own affairs. For this northern association a compact registration, called the "Oldenburg Stud-book," was created.

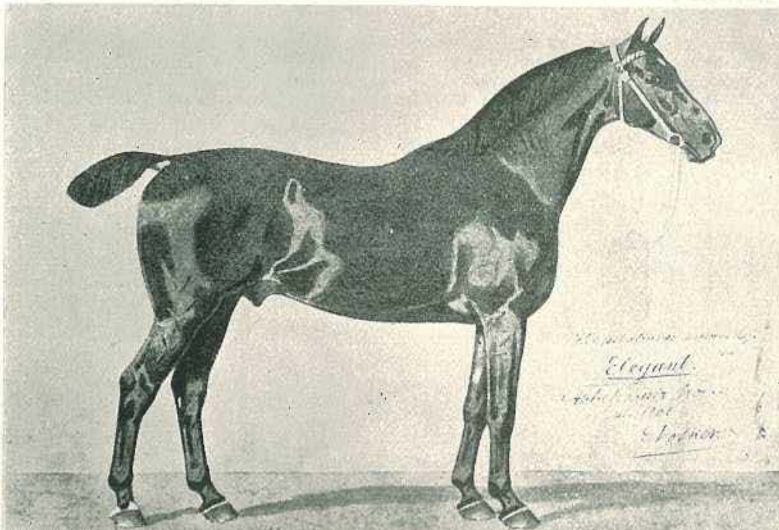
The headquarters of this association is at Roden-Kirchen—*i.e.*, on the Hude-Nordenham Railway, a branch of the Bremen-Oldenburg line.

The objects of the association are—

1. Proposal of suitable judges of horses for superintendents of the grand ducal selection commission.
2. The editing of the stud-book of the northern breeding district.
3. The tendering advice on matters connected with horse-breeding to the Government and the selection commission.
4. The improvement of the breeding stock in the district by the retention of suitable breeding animals therein, especially by granting premiums and by the purchase of such animals.
5. The carrying out of any measures to further the welfare of horse-breeding in the district, particularly in facilitating the sale of the progeny, the extension of markets, the arrangement of exhibitions, the holding of examinations of performances, &c., &c.

The chairman of the association is one of five members of committee, who is sworn to do his duty (present chairman: landed proprietor. Ed. Lübben-Süwürden.)

Plate XXI.



4. Elegant, No. 1387. 5. Frieschütz, No. 1399, 6. Kurfürst, No. 1443.

The district is divided into thirty-seven sub-districts, each controlled by a supervisor and three confidential men, who are also sworn in. The thirty-seven supervisors constitute the committee of the association. The committee decides all the affairs of the association, it elects members of the council, and controls the management.

Councillors and committee-men must be members of the association, and consequently breeders. Thus the Oldenburg horse-breeding industry is entirely managed by men of experience, who are chosen by the breeders interested. Thus it will be seen that the legislator who devised this kind of association representatives did a wise thing, which will for ever be recognised as such.

The pedigree register hitherto conducted by the State and the two first volumes of the Oldenburg Stud-book were recognised as the foundations of the new stud-book, and the numbering of the latter was, as constituting the most important part of the groundwork, restored to the new one. The stock not registered in the two works above mentioned, in so far as they were not progeny of those registered, was subjected to a compulsory selection, so that, in the year 1897, 8,400 mares in round numbers were entered.

In accordance with the law, those animals the progeny of registered sires and dams will be entered without selection under their own number and their own name as soon as they are three years old and are used for breeding purposes. The stallions selected by the State, which have not been registered in the Oldenburg Stud-book, will be noted in stallion register of the stud-book. Up to the present there is a total of 1,400 selected stallions and nearly 11,000 mares registered

All animals registered or noted for registration are branded with a special brand prescribed by law on the left hind thigh.

Buyers, therefore, will consult only their own interests if they satisfy themselves, before completing a purchase, of the presence of the brand; they should also be advised not to take any animal without a certificate taken from the stud-book.

To prevent confusion (fraud ?), we here give a representation of the East Friesland brand, somewhat similar to that of Oldenburg—

Every owner of a registered mare is a member of the association, and is bound to notify the superintendent of his district, within fourteen days, the birth of fillies out of such mares, as well as every addition or reduction of registered mares or such as are noted for registration. The superintendent is also bound to furnish the information to the stud-bookkeeper.

The stud-bookkeeper is chosen from the members of the association, his appointment is confirmed by the Minister of State, and he is sworn in.

Thus the law, to a certain extent, took the business of horse-breeding out of the hands of the Oldenburg agriculturist, and gave it a special representation. For although there is no restriction placed upon the Agricultural

Chamber, which has existed since 1900, to advise on matters connected with horse-breeding, still that chamber is neither the recognised representative of the horse-beeders nor the central bureau of the same. On the other hand, the united breeders who are members of the association are the office-holders, and their journal is the recognised representative of the breeders of the Oldenburg coach horse. At present the members of the association number 3,200, and its register of dams and sires consists of 70 working stallions and 7,000 mares.

PREMIUMS.

According to past regulations settled by law, State premiums were only awarded for superior stallions and mares; according to the present regulations, considerable sums are set aside for one and two year old blood foals and fillies.

The following premiums are yearly at the disposal of the northern breeding district:—

I.—From the State Treasury.

(*a*) For stallions—*i.e*, for selected stallions—four years old and upwards—

1st prize, 1,800 marks = £90.
2nd prize, 1,500 marks = £75.
3rd prize, 1,200 marks = £60.

Besides this there is added prize money for stallions at least three years old which have been just selected as follows:—

1st prize, 750 marks = £37 10s.
Two 2nd prizes, each 600 marks = £60.

(*b*) For brood mares, three or four years old—

Four 1st prizes, each 500 marks = £100.
Five 2nd prizes, each 400 marks = £80.
Fourteen 3rd prizes, each 300 marks = £210.

For five-year-old up to eight-year-old mares (proved to have thrown specially good progeny)—

Six prizes, each 300 marks = £90.

II.—Half from the Land Bank and Half from the Breeders' Association.

(*a*) For colts, namely:—

For sucking foals—
8 prizes, each 200 marks, £80;
For one-year-old foals—
6 prizes, each 300 marks, £90;
For two-year-old foals—
4 prizes, each 400 marks, £80.

(*b*) For fillies, namely:—

For one-year-old fillies—
10 prizes, each 150 marks, £75.

All these prizes will only be awarded to specially suitable breeding horses which are free from hereditary faults.

The owner of a stallion which has been awarded a prize or the added money prize is bound to send the animal to the breeding district to serve for two seasons after receiving the prize. Any owner not complying with this regulation must refund the amount of the prize together with a penalty to the value of the prize to the Treasury.

The owner of a mare which has been awarded a prize must carry out the following regulations under penalty of repayment of the prize money to the Treasury together with the penalty as above:—

1. The owner of the mare must, during the following three years, have the mare served either by a prize stallion or by a particular stallion chosen by the selection commission.
2. He must within the three years produce the mare every year before the selection commission, together with its progeny born during that time, and must also produce the service certificate for the current year.

The owner of a foal which has obtained a prize is bound under the penalty of refunding the prize money, as well as payment of a fine equal to the amount of prize money—

1. Not to send the foal out of the breeding district during the year following the awarding of the prize. To produce the animal before the award commission at the show following the grant of the premium. To bring it forward, when it is from two to two and a-half years older than when it was awarded a prize, at the next stallion selection, and, if it is selected, to send it for service in the following year to the breeding district.
2. In the case of a filly, the owner must not send it out of the breeding district until it has reached the age of fitting it for breeding purposes, and during this time he must produce it yearly at the appointed places to be vouched for as having arrived at maturity.

All these regulations were made in order to keep up the standard of the breeding stock, and to assist the breeders to protect their stock from the alluring offers made by foreign dealers with an eye to profit. And yet every year prize animals are sold out of the breeding district, and hence it has become a question with the incoming corporation whether the raising of the premium should not be taken into consideration.

Private Association for the Improvement of Horse-breeding.

Besides the measures prescribed by law for the improvement of horse-breeding, various private associations are actively engaged in helping to raise the standard of horse-breeding. We may mention—

The Association (under the patronage of the Grand Duke) for the Promotion of the Oldenburg Country Horse-breeding Industry, which holds an annual race meeting, and thus compels proof of the performances of breeding animals; the Association of Stallion-owners of Oldenburg; the Association for the Improvement of Horse-breeding in the jurisdictions of Varel, Westerstede, and Oldenburg; several trotting race associations; the stock show societies of Ovelgönne, Stollhamm, Berne, Jever, Oldenburg, Delmenhorst, and Westertede.

Ownership of Stallions.

The service stallions are all owned privately; there is no Government stud farm in Oldenburg.

Since the demand for Oldenburg stallions has raised their price to one before unknown, the risk of the owners became greater. Consequently, several associations of stallion-owners, were formed, which now, in conjunction with private stallion-owners, are striving to keep the best stallion stock in the country.

The minimum fee for service is fixed by law at 20 marks (£1). In order to prevent too many mares being brought to the best stallions, the owners raised the fee considerably—in some cases to 60 marks (£3). But these high charges do not alarm the breeders, so that it often happens that a really good stallion will cover probably 200 mares in a season. That 70 to 80 per cent. of these mares, as a rule, are in foal is a very good result of the measures taken, especially when it is considered that this choice of certain stallions is repeated for years.

Sir Walter Gilbey says, in his work "Horse-breeding in England and India and Army horses abroad": "Hundreds of pairs of carriage and coach horses have been sold every year in London at from £200 to £500 per pair, the purchaser being quite unaware of their foreign origin. At recent sales, brown and bay upstanding coach horses from coaches running during the summer out of London have sold at from 100 to 200 guineas; a pair purchased by a friend cost 350 guineas. There can be no doubt whatever where these animals were bred; if anyone took the trouble to trace their pedigree, it would be found that they came either from the Oldenburg province of Germany or from the horse-breeding districts of Normandy in France; there can be no mistaking the breeds." The Oldenburg breeders may justly be proud of such a statement by one who is considered in England as an authority amongst breeders, for not only does it mean an acknowledgment of the quality of the Oldenburg horse, but, what is still more to be considered, the permanent evenness of the race. Of foreign countries beyond Europe, America, and notably the United States, takes a large number of breeding stallions. During the last ten years it is authentically stated that more than 1,000 breeding stallions of the Oldenburg race have been sent there. For many years America has had a Breeders' Association which has made it its business to extend the registration of Oldenburg breeding stock. The Oldenburg horses have also found their way to Australia and South America, and they have found many advocates there owing to their retention of their hereditary qualities and to their being easily able to adapt themselves to the climate. In America, as well as in Australia, the Oldenburg horse has carried off the highest prizes at exhibitions, and here one need only remember the results of the world's fair at Chicago, the many prizes gained in Buenos Ayres, in Sydney, and lately the champion prize at Buffalo. Even in South Africa the Oldenburg horse is found, and in the Transvaal it was intended to establish a special class at the exhibitions for them.

PROFIT IN BREEDING MULES.

To begin with, mules can be raised cheaper than almost any other farm stock. Especially is this true when compared to horses. They can be given light work when two years old, and if properly handled will often at this age do as much work as a four-year-old horse colt. Of course, under no circumstances, should the work be heavy, for the growth of the animal will be checked. If used for driving, for pulling a light cultivator, for hauling moderate loads, the animal is better off than if allowed to remain idle. The growth is not checked, but the muscles are hardened and developed, so that at four or five years old a perfect work animal results. With this kind of training they will go into market much earlier than horses, and consequently the investor gets a quicker return on his money.

The mule stands heat much better than the horse. In the north this is not so important as in the south, but during harvesting time the man who has two or three good teams of mules is far ahead of his neighbour who has none. They can stand more abuse and greater hardships than horses, but respond to kind treatment by being very gentle and teachable. They are less liable to diseases, and are not so apt to become blemished as colts. If a lot of them are in pasture during the season, fewer of them will show blemish than the same number of colts kept under like treatment. Another important item is the fact that mules instinctively avoid rough and dangerous places. They are much more careful to secure a good footing when on a rough road or crossing a dilapidated bridge. It seems that the mule's nerves are stronger, and they do not lose their heads when they get into a close place.

For all kinds of farm work they are especially steady and always ready. In planting corn or opening a furrow through a field it is very much easier to drive straight with a good mule team than with horses. In ploughing corn they use much more judgment in keeping off the hills. Their hoofs are usually very tough, and it is seldom necessary to have a mule team shod on the ordinary farm, unless they are to be used a great deal during winter weather, when roads are frozen or icy. Keep the hoofs carefully trained, and if the animal has never been shod there is seldom a call for shoes.

Mules can be placed on the market any time after weaning. In mule-raising regions, they are considered saleable property after ten months old. By pasturing and feeding until they are two and a-half and three years old, they are ready for market. They eat a small amount of feed; and while they, of course, prefer good hay and grain, they will eat almost any kind of rough feed. It this way it is possible to raise them cheaper than horses.

In a discussion at a recent Illinois live stock meeting, it was brought out that for the average farmer mule-raising is more certain and profitable than trying to raise horses. This is probably true from the fact that people who are not experts in animal husbandry can succeed very well in raising mules.—*American Agriculturist.*

Poultry.

PRACTICAL POULTRY-BREEDING, No. 3.

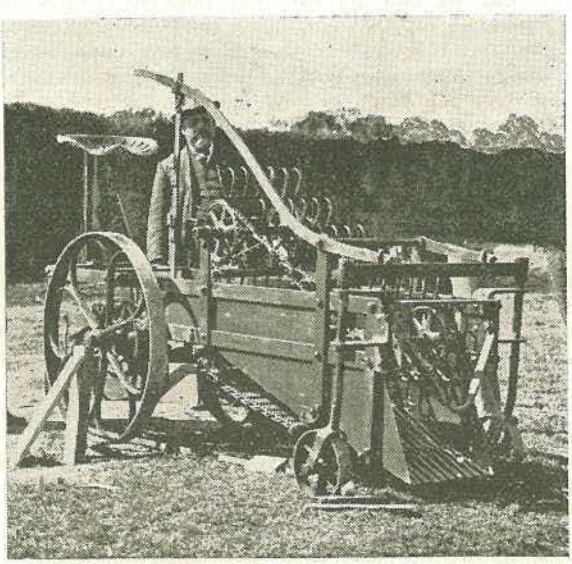
By W. HINDES.

The most important matter after breeding good layers is the feeding Care should be taken to feed good egg-producing food containing a fair proportion of proteids; maize is too heat producing. About the best for every-day use is pollard in the morning, mixed with skimmed milk (boiled), and given warm; or, if milk is not obtainable, boiling water can be used. This should be thoroughly mixed into a crumbly mass, not sticky. A little bran might be mixed with the pollard in the proportion of 1 to 2, but too much bran must not be used, as it is very indigestible, and might cause intestinal troubles; as, however, it contains a larger proportion of proteids than the pollard, a little may be fed with advantage For the evening meal, wheat and good heavy oats, given alternately, will be the best for warm weather; for winter time, barley is a very good food, and may be used alternately with the wheat and oats with good results. Maize can be fed once a week in winter, and also on cold, wet days; it is about the best known food, but should not be used as a regular diet, being too fattening. The production of eggs can be greatly increased by giving about ½ oz. of green cut bone per day to each hen; but, should the laying hens be over-stimulated and made to lay excessively during one year, they will not lay so well the next, and in that case it would be better to kill them off when they are about eighteen months old, and have a fresh lot of pullets to take their places. In this way we can get the best possible results, for pullets will generally lay for the full twelve months, but the following year they can only be depended on to lay for about nine months, as they have the moulting season to go through, and, if they have had an exceptionally heavy laying, they may possibly take a rest for four or five months, during which time they are being fed for nothing. It is a good plan to rear each year the pullets required as laying stock; it certainly involves a little more trouble in rearing, but breeders trying it will be well repaid for their trouble, especially if the pullets are stimulated for a large production of eggs. The price at which the hens are sold will about equal the cost of rearing the young ones, so that there will be three months' extra laying with the pullets to balance the additional trouble in rearing the chickens; this should amount to at least 3s. for each pullet. This breeding of pullets each year refers only to the laying flock, and not to the breeding stock, since well-matured birds generally breed better chickens As regards the quantity of food to be given, it depends entirely on circumstances. If, for instance, it takes 3 oz. of food per day to keep a hen in good condition when she is not laying, and you require her to produce, say, four eggs of 2 oz. each per week, she will require 1 oz. per day more food when laying than when she is not, otherwise she will fail to produce the eggs mentioned. There is no hard and fast rule to be laid down as regards quantity; the feeder must use judgment. A very good plan is, if the fowls are confined in small run, to give them about half a feed of the pollard early in the morning, just to break their fast; then give them small seeds, such as panicum thrown in some litter, and make them scratch for it; then give them in the evening as much grain as they will eat up eagerly; but as soon as they begin to pick it over, it is time to stop. Should they appear to have no appetite, miss a feed altogether or give them very little. Should the fowls have a large run they will not require so much food as those confined in small runs, for they will find a good deal, such as insects, grass seeds, &c., for themselves; therefore half a feed in the morning and as much as they will eat at night will be quite sufficient. It is always advisable, if possible, to let them have a free run, and they will then get plenty of exercise and will not lay on fat to the same extent as fowls that are penned up. If, however, the penning up is unavoidable, they should be given as much exercise as possible by having their grain buried in some litter, to make them scratch for it. Another thing that must not be forgotten is to give plenty of green food, such as lucerne, lettuce, cabbage, &c. A very good plan is to hang a bunch of lettuce or a head of cabbage about 2 feet 6 inches from the ground, so that the fowls have to jump up to reach it; this also gives them exercise, and does them good. Always give them plenty of clean fresh water, keeping it where they can always get at it; change it every day, and do not allow it to remain exposed to the sun, for sun-warmed water is apt to make the birds sick, and may bring on cholera. Always keep grit of some kind, and also some dry bonedust to supply lime for the shells; crushed oyster-shells will answer this purpose, if bones are not procurable. Good laying hens, fed as suggested, will bring in a good return, and be a credit to their owners.

N.B.—Next month feeding chickens will be dealt with.

NEW POTATO DIGGER.

Again a potato digger is given to the farmer, this time by Mr. Daniells, who claims what may be considered perfection for his invention. As will be seen by the illustration, it takes up three drills of potatoes with weeds and haulms. The latter are separated from the tubers by hooks passing on an endless chain, and are thrown onto a shoot which sends them off to one side clear of



the potatoes which are graded by two sieves. The small tubers are laid in one heap, the larger in another. Each heap contains one-third of a bag, so that a bag may be filled without moving it from its place. The machine was, unfortunately, not put to work, so that, until a trial has been made in the field, it is impossible to predict either its success or failure.

The Orchard.

MONTVILLE STRAWBERRIES.

Many years ago, shortly after separation from New South Wales, when Queensland set out on her career as a separate State, a considerably impetus was given to fruit-growing, principally citrus fruits, pineapples, custard apples, and bananas. As for apples, pears, and strawberries, it was considered by all but a few sensible horticulturists that these would never be grown successfully in this State. It needed but a visit to the district exhibits at the late exhibition at Bowen Park to dispel such an idea. We have such a splendid diversity of climate and soil, both on the coast and inland, that it would be hard to say what European fruit will not grow, and grow to perfection, in some parts of the country. In the matter of strawberries, Queensland can vie with and even excel the European fruit. The strawberry-growers of the Blackall Range, Mooloolah, Montville, and of districts around Brisbane and Ipswich, such as Wellington Point, Redland Bay, Cleveland. Esk, and other places, have devoted themselves to the production of new varieties with such success that to-day they can show, not only small garden plots, but acres of such strawberries as are only to be seen in France or at Covent Garden in London. That splendid strawberry, the Aurie, raised by Mr. Court at Mooloolah, some new varieties, including the well-known Pink's Prolific, raised by Mr. Pink at Wellington Point, are good evidences of the careful and successful work of such painstaking growers. We have received from Mr. W. H. Harvey, of Montville, a sample of such fine strawberries as we have not yet seen in the market. They belong to the Marguerite and Annetta varieties, and are perfect marvels of size, symmetry, colour, and flavour, and should command a very high price in the market. It seems incredible that such magnificent fruit has been produced, and that in quantity, so soon after the close of the all-devouring drought. Mr. Harvey may, we think, be congratulated on putting on the market what is undoubtedly the finest sample of strawberries which has yet been seen even at any town or country shows.

HOW TO PLANT CUTTINGS.

Many amateurs make great mistakes in planting cuttings. They leave three-fourths of the length of the cutting above ground, and very often push the cutting down by main force into the soil. The most successful way is to make cuttings from 6 to 12 inches long, inserting them by means of a "dibber" —usually the handle of an old spade or shovel, cut a foot in length and sharpened—to such a depth that only about two eyes or buds are exposed above ground. The injury done by forcibly pushing the cutting down into the soil is that the bark is bruised around the base of the cutting where the root-forming callus emerges. If this bruising takes place, decay begins ; the callus does not form, and the cuttings perish. This suggestion should be observed in making cuttings off any kind of plant. It should also be remembered that the secret of getting cuttings to strike is to firm the soil round the extreme base or bottom of the cutting. For this reason to make a trench made with a slightly sloping side and of the required depth is the better way. The cuttings are laid along this side, and the soil filled in and pressed with the foot firmly against the base of the cutting. The top soil is left loose.—*Garden and Field.*

Botany.

CONTRIBUTIONS TO THE FLORA OF QUEENSLAND.

By F. MANSON BAILEY, F.L.S., Colonial Botanist.

Order ORCHIDEÆ.

SARCOCHILUS, R. Br.

S. Weinthalii, *Bail.* Stems short; roots white, rather fleshy. Leaves about 5, somewhat curled, nearly erect or spreading, about 2 in. long and 5 lines broad, obtuse or somewhat acute. Racemes with the peduncle slightly longer than the leaves, bearing from 4 to 9 white prominently spotted fragrant flowers. Bracts narrow-lanceolate, $1\frac{1}{2}$ to 2 lines long, sometimes with a large dark-coloured spot near the middle. Pedicels with ovary 2 lines long, dotted. Sepals and petals similar, the latter rather shorter than the former, oblong, obtuse, marked along the back with from 1 to 3 large dark-purple spots, which show through to the face of the segment; each segment also is marked at its base with a cluster of smaller spots. Labellum sessile at the end of the basal projection of the column, the lateral-lobes linear, falcate, incurved and meeting at or above the anther, purple dotted on the face, middle-lobe almost globular, velvety-glandulose on the back with a large purple spot at the centre; disk with a few short purple lines and 2 yellow spots at the base; transverse scale thin, entire, slightly yellow-stained, sides woolly-glandulose. Column yellowish-green, $\frac{1}{2}$-line high. Anther pale-yellow, rostrate. Pollen-masses ovoid, yellow.

Hab.: On the stems and branches of trees, Main Range, near Toowoomba, *F. Weinthal*, September, 1903.

GLOSSODIA, R. Br.

G. minor, *R. Br.*, **var. alba.** This only differs from the typical form in its flowers being a pure white, not deep blue.

Hab.: Wellington Point, *Colin Kefford*.

FRUIT FLIES—A SHORT LIFE.

Fallen fruits such as mangos will be found to be very soon infested with maggots of the small fruit flies (*Drosophilila*, &c.) which are attracted by the smell of the fruit. Bananas and other fruits also attract these flies. Some of these flies were recently reared to determine the length of their life. A mango was partially peeled and exposed to the flies and then removed to allow the eggs laid by the flies to hatch.

The following notes show the sequence of events:—

Exposed mango to flies, 27th June, 12 a.m.
Removed mango, 28th June, 8 a.m.
Large maggots found, 1st July, 8 a.m.
Puparia (Chrysalids) found, 2nd July, 8 a.m.
First fly, seen, 5th July, 2 p.m.

The whole life-history thus occupied eight days from the earliest time the eggs could have been laid till the fly emerged. This is shorter even than that of the common mosquito (*Culex pungens*) stated by Dr. L. O. Howard to have a minimum life-history period of ten days.—*Agricultural News*, Barbados.

Tropical Industries.

THE WEST INDIES AND COTTON.

Under the above title a most interesting article, discussing the present and future supply and demands for cotton, appeared in *Our Western Empire* for April.

It is first pointed out that, while at one time Great Britain bought 70 per cent. of its cotton from the West Indies, the cultivation of cotton here has practically died out. The advantages that the rising of cotton possesses over fruit and cocoa production, in the way of the immense and constantly increasing demand for cotton, are then emphasised. In this connection it is mentioned that "while during the last 100 years the consumption of flax has doubled and that of wool has increased five times, the consumption of cotton has been multiplied by thirty-nine." Again, quoting from the *Yearbook* of the United States Department of Agriculture for 1901, it says: "It therefore seems more than likely that the cotton industry will go on expanding until the whole of the inhabitants of the world are clothed with the product of its looms."

Another point to which attention is drawn is the fact that, since 1898, the United States have been the largest cotton manufacturers in the world, and that, as their manufacturing industry develops, they will have less available for export.

The great suitability of the West Indian islands for cotton cultivation is next insisted upon, and mention is made of the efforts of Dr. Morris in actively promoting the resurrection of the industry, before the British Cotton Growers' Association had begun to move in the matter.

The experiments and efforts in cotton-growing that have been made in the West Indies, most of which have already been described in the *Agricultural News*, are then summarised.

The article concludes as follows:—

"In the cultivation of cotton the West Indies may be said to have already made something of a start, about 500 acres in all being under cultivation, and, if the industry is energetically pushed, there is probably a good future before it.

"The fact must not be lost sight of that Sea Island cotton, which is indigenous in the West Indies, and can probably be grown there more successfully than in any part of the world, is a long, staple cotton like Egyptian, and for these long-staple cottons there has been, during the last few years, a steadily increasing demand; indeed, the Lancashire spinners are often at their wits' ends to know how to fill their orders. On the other hand, the growing tendency in America to build spinning-houses close to the cotton-fields is causing American cotton, even more and more, to stop at home. There is no substitute for cotton, as beet is for the cane. It is an article of every-day use and of necessity. The wealth of the mother country to a great extent depends on its supply. The West Indies have special qualifications for meeting the demand. Why not meet it?"—*Agricultural News*, Barbados.

THE COTTON-SEED INDUSTRY IN THE UNITED STATES OF AMERICA.

In the *Year Book* for 1901 of the Department of Agriculture for the United States of America, pp. 285-98 (says the *West Indian Bulletin*), appears an interesting paper entitled "The Cotton-Seed Industry," by Mr. Charles M. Daugherty, of the Division of Statistics.

This paper demonstrates in a striking manner the enormous strides made by the cotton-seed industry in the United States of America during the past twenty years. This increase has been mainly due to the important industrial uses now made of cotton-seed oil and oil cake. In 1901 over 49,000,000 gallons of cotton-seed oil were exported from the States in addition to over 47,000,000 gallons retained for home consumption.

Cotton-seed oil cake now enjoys a very high appreciation as a cattle food, and is in correspondingly high demand. It is, indeed, more highly appreciated as a stock food in Europe than in the United States.

The important lesson taught by this paper is the danger of putting aside anything as a "waste product" before it has been fully tried. In America as in the West Indies (in the old days of cotton cultivation) cotton seed was accounted of no value. The trouble indeed was to get rid of it. All this is changed, and the cotton seed with its by-products now forms an important crop in the United States, and gives employment to "tens of thousands of labourers."

Cotton-seed oil and oil cake are very largely imported into the West Indies for culinary and estate purposes. The cultivation of cotton is now being taken up in several of the islands, and, if the seed is properly utilised, should lead to a substantial reduction in the importation of cotton-seed oil cake, and should aid in the securing of that measure of self-support which is essential to the welfare of the West Indies at the present time.

The following is an abstract of the paper:—

Cotton is distinguished from all other fibre plants in that the lint or fibre is attached to the seed. Owing to this fact the seed of the cotton plant has always had to be gathered and handled by the cotton-growers. The cotton gin was invented over 100 years ago, to separate the cotton from the, then worthless, seed. For nearly three-quarters of a century the seed was not made use of, and during that period it formed "the most important contribution of the Southern States to the world's great volume of waste."

GROWTH OF THE INDUSTRY.

It is true that, as early as 1826, a mill was erected in the United States for extracting the oil from cotton seed, but so slowly did the industry progress that as recently as 1867 there were only four mills in actual operation in the United States. The poor keeping qualities of cotton seed, and its tendency to deteriorate when stored, necessitate that the mills shall be in the neighbourhood where the cotton is grown. Between 1867 and 1897 nearly 300 mills were erected in the cotton regions of the United States, about one-third being in Texas, "where not far from a like proportion of the cotton crop is now annually grown."

USES OF COTTON-SEED OIL.

The rapid growth of the industry was due to the industrial uses to which it was found the products of the cotton seed could be put. At first, cotton seed, although of intrinsic value, was put on the market as a substitute for, or an adulterant of, other already recognised articles; appearing, for instance, as "pure olive oil." It was found also that the oil mixed with a certain "proportion of beef products," made a good substitute for lard, and "compound lard" was placed on the market as a substitute for hog lard. A considerable number of mixtures are now on the market, some containing pure lard, others not, and it is estimated that 30 per cent. of all the cotton-seed oil made in the States is utilised in the manufacture of various substitutes for lard. "In fact, the price of this oil is now largely regulated by the fluctuations in the price of lard."

Other important uses are as a substitute for olive oil in tinning sardines, &c., and as an ingredient of artificial butter. The lower grades of the oil are employed in the manufacture of soap, candles and glycerine, phonograph cylinders, &c. A bleached oil mixed with kerosene is used in miners' lamps. A deficiency in drying qualities prevents cotton-seed oil from competing with linseed oil for painting purposes, and a gum renders it undesirable as a lubricant.

By-products from the Manufacture of Cotton-seed Oil.

Short Lint.—Upland cotton is the variety most extensively grown in the United States. Its seeds are covered with a coating of short lint, not removable by ordinary ginning. The first step at an oil mill is to clean and regin the seed. By this means some 30 lb. of short lint is obtained from each ton of cotton seed.

"From the seed of a cotton crop of 10,000,000 bales there could thus be effected a saving, assuming that the entire crop were used, of about 300,000 bales of short lint, which at an average price of 15·00 dollars a ton would amount to 4,500,000 dollars."

Cotton-seed Hulls.—The seed, after having been reginned, is run through machines which cut it to pieces and separate the hulls from the kernels or "meats." One ton of cotton seed yields nearly half a ton of hulls. These were formerly used for fuel, but they have been found to form, mixed with cotton-seed meat, a superior food for cattle, and "a steady demand now exists throughout the Southern States for the entire supply." The possible value of the hulls from a crop of 10,000,000 bales of cotton is estimated at 8,000,000 dollars.

Cotton-seed Oil Cake.—The kernels constitute about half the weight of the seed, and yield about 30 per cent. of their weight of oil; 1,000 lb. of meats give on an average 300 lb. of oil or 40 gallons. The remainder, about 700 lb., is the well-known cotton-seed oil cake, or, after it is ground, cotton-seed oil meal.

Cotton-seed oil cake is a cattle food of very high value, containing on an average:—

Protein	43·26 per cent.
Nitrogen-free extract	22·31 „ „
Fat	13·45 „ „

Until within the last twenty years cotton-seed oil meal and oil cake made in the United States have been largely exported, competing successfully in the European markets, as a cattle food, with the by-products of flax seed. The oil cake retained in the States was used as a fertiliser rather than as a food. "Since the remarkable development of the cotton-seed industry in Texas, cotton-seed meal, mixed with cotton-seed hulls and mill feeds, has been extensively adopted as a fattening food for cattle in the South-western States. Several hundred thousand head of cattle fattened upon this product are shipped thence each year, and its use as a feed has now become popularised to a limited extent throughout the entire south. The bulk of the cotton-seed cake and meal manufactured in the United States is, however, still exported. . . . Practical economy has demonstrated that its full value is best realised in the cattle-feeding industry."

At the low price of 20·00 dollars a ton it is estimated that the cake or meal alone from the cotton seed of a 10,000,000-bale cotton crop would be worth about 35,000,000 dollars.

Present Condition of the Industry.

Within the last few years a great impetus has been given to the cotton-seed industry, and, since 1897, 200 additional mills have been erected in the cotton-growing States. Altogether there are now some 500 mills manufacturing oil. About one-third of the mills are situated in Texas, the most important cotton State. It is estimated that about 50 per cent. of the total crop of cotton seed raised in the United States is now manufactured in the mills, of the remainder a large quantity is used for planting purposes—"the seed being sown by an extremely wasteful method, 1 inch apart in the rows, 90 per cent. of the growing plants to be afterwards 'chopped' out in thinning. Also, the hereditary habit, among many cotton-growers, of carelessly handling this formerly waste product, together with its ready susceptibility to damage from rain or moisture, doubtless unfits considerable quantities yearly for manufacturing purposes." Cotton-seed oil, oil cake, and oil meal are in steady demand in both the United States and other countries. Cotton seed itself now commands high prices, and it is thought that under these influences the industry will be stimulated, and soon result in the manufacture of every pound of cotton seed raised in the United States.

Benefits of the Industry.

The magnitude of the cotton-seed industry may be gauged by the fact that a capital of over 100,000,000 dollars has been invested in it. Employment is furnished to "tens of thousands of labourers, almost exclusively of the resident negro race." The foreign export trade of the Southern States in oil and oil cake is worth 25,000,000 dollars to 30,000,000 dollars annually. In some States cattle-feeding has received a great impetus, and is probably carried out on a large scale.

In fact, the cotton-seed industry, originally based on the chance discovery that a cumbersome and unsaleable by-product of the cotton belt was rich in oil, valuable chiefly for adulterative purposes, has now been transformed into a separate, distinct, organised business, and its manufactured products are sold extensively both in foreign and domestic markets on their own merits, for a great variety of purposes. The cotton-seed crop is now an important entity in the agriculture of the country, and has the distinction of being the most valuable oleaginous seed crop produced in the United States.

Statistics of Industry, 1872-1901.

Year ending June 30.	Cotton-seed Crop.	Percentage of Crop Manufactured.	Oil Produced.	Oil Cake Produced.
	Tons.		Gallons.	Tons.
1872 ...	1,317,637	4	2,108,000	18,400
1877 ...	1,968,590	5	3,937,000	34,400
1882 ...	2,455,221	12	11,785,000	103,100
1887 ...	3,018,360	23	27,769,000	243,000
1892 ...	4,273,734	25	42,737,000	374,000
1897 ...	4,070,100	40	65,122,000	569,800
1901 ...	4,830,280	50	96,605,600	845,299

The most interesting fact in the above table is the enormous increase in the percentage of the crop of cotton seed manufactured. From only 4 per cent. in 1872, it rose to 12 per cent. in 1882, 25 per cent. in 1892, and was 50 per cent. in 1901, the last year for which returns were available.

World's Trade in Cotton-Seed Oil and Oil Cake.

The United States at the present time practically control the markets for cotton-seed oil and oil cake. This is to a great extent due to the perishable nature of the cotton seed, necessitating the manufacture to be carried on in close proximity to where the cotton is grown. In the Egyptian and Sea Island varieties, the seed has not, as in Upland cotton, a coating of short lint left on it after ginning, and accordingly does not heat and deteriorate so rapidly. Egyptian cotton can be transported to some distance without damage, and a large industry is carried on in England and Hull, in the preparation of cotton-seed oil, &c., from Egyptian cotton. A considerable manufacture is also carried on at Marseilles with Egyptian cotton seed. Altogether, however, England and France crush less than one-quarter the amount of seed crushed in the United States.

Exports of Cotton-seed Oil.

The average consumption of cotton-seed oil in the United States of America is over 40,000,000 gallons annually. The home demands for this product have not increased rapidly of recent years, and the great increase in production mentioned above has been absorbed chiefly by foreign demand. The home and export markets of the United States now share, very equally, the total production of oil.

Of the cotton-seed oil exported, 85 to 90 per cent. goes to Europe; France and Holland being the largest consumers. France uses large quantities of low grade oil for refining and soap manufacture, and high-grade oil for various edible products, whilst Holland mainly imports high grades of summer yellow or "butter" oil for the manufacture of artificial butter. A great increase in trade is reported with Mexico, and, to a less degree, with some of the South American republics.

The total exports of cotton seed oil from the United States for the past three years have averaged, in cash value, 14,000,000 dollars.

Exports of Cotton-seed Oil Cake.

Cotton-seed oil cake is consumed only to a limited extent in the United States as compared with European countries. During the last two years only about one-quarter of the amount made has been retained for home use, and of this perhaps one-half has been employed for mixing with fertilisers. Germany is the principal customer, followed by England whose finely-bred herds [of cattle] consume a larger quantity of cotton-seed cake and meal than do those of any other country on earth. Germany, England, and Denmark take together about 85 per cent. of the cotton-seed cake produced in the United States, the total value of which for the past three years has been 11,000,000 dollars per annum. The "principal cis-Atlantic participants in the small balance of the trade are the Dominion of Canada and the West Indies." . . . "Notwithstanding the high prices that this product now commands, its greatest economic value would undoubtedly be realised by larger use as a domestic cattle food, thereby not only realising its value as a feed, but also returning its rich fertilising properties to the soil."

KAPOK.

Kapok, so well known as a soft material largely used in the upholstering trade for stuffing chairs, &c., and equally largely employed for stuffing mattrasses and pillows as a substitute for feathers, hair, &c., is the product of a kind of cotton-tree (*Bombax pentandrum* or *Eriodendron aufractuosum*), much grown in Java of late years for the sake of the fruits which produce the fibre, which meets with a ready sale in European markets in large quantities. Dr. James Neish, M.D., contributes an interesting article on this product, adapted from the *Journal d'Agriculture Tropicale* to the *Journal of the Jamaica Agricultural Society*. Amongst other things we read that of late years the journals and reviews of Java have on different occasions shown the profit which could be drawn from this tree. A very good article, written with this object, appeared in the *Indishe Mercuur*, in 1901; and this article has certainly not been without influence on the constantly increasing cultivation of kapok in Java. Here are some extracts:—"Even before the fruits of the kapok have arrived at maturity, many Chinamen seek to get hold of them, if need be, by buying them. The importation into China must be exceedingly large, judging by the demand which is made for it in that country. About 10 cents is paid for 100 dried fruits. A Dutch cent is the hundredth part of a florin; accordingly, the cent is worth one-half an American cent or about one farthing. An adult cotton-tree, growing from a cutting, yields full

5,000 fruits. Trees grown from seedlings produce more. This tree grows rapidly, and begins to bear from the second year. It requires no attention, and grows even on very poor soils, and is not exacting as regards water." An energetic Chinaman in Solo (Java) said, "If I possessed a concession, I would plant cotton-trees on it on a large scale, and it would be seen if I did not draw more profit therefrom than those who spen thousands of florins on the ordinary cultivations, the expenses of which consume all the profits. If cotton-trees were planted on the bare mountains of the South, I am certain that the operation would be advantageous." These words were brought to the attention of the planters. In 1889, 1889, and in 1890, the importations into China must have been considerable, but the Chinese kept the matter secret for they fear the competition of European merchants.

At the present time, there are in the central parts of Java some fifty plantations whereon the kapok is harvested as an accessory product, on some even as the principal product, whilst ten years ago five only gave attention to it.

According to official figures, the exportation from Java rose from 1,888,639 kilos to 2,777,467 kilos in 1896. Of 38,586 bales which were exported in 1896, 25,161 were sent to Holland, 8,159 to Australia, 745 to China, and 216 to America.

The yield of kapok per tree per annum, it is said, varies from 1 to 50 kilos (2 lb. 3¼ oz. to 111 lb.). (According to Dr. Warren de la Rue, the kilogramme is equivalent to 2·2046213 lb. of 7,000 grains; usually the kilo is reckoned at 2 lb. 3¼ oz. avoir.) Dr. Greshoff has ascertained the average weight of the dry fruit to be 26 grammes and 80 centigrammes; the fluff or kapok weighed 4 grammes 20 centigrammes; the seeds (to the number of 175) 10 grammes 20 centigrammes; the pod weighed 10 grammes 30 centigrammes, and the stalk weighed 1 gramme 20 centigrammes.

In the cleaning of kapok in Java, use is made at the present time of small iron mills, each giving two piculs of cleaned merchandise for a day's work. (The picul in Java weighs 61 kilos 220 grammes, about 137 lb.) Each mill employs about four women to receive the merchandise, to fill up the bags and carry them into the "godowns" or storehouses, where they are pressed into bales. (Generally, the bales weigh 37 kilos for the cleaned kapok and 80 kilos for that which is not cleaned.) Improved machines for cleaning kapok are made by Thomas Barraclough, of 20 Bucklersbury, London It should be remembered that for export it is not advisable to press the kapok excessively; this would impair the elasticity of the fibres.

In 1898 the quotations in Holland were—Extra cleaned, 39½ cents to 36 cents the half-kilo (nominally, 1 lb.) (10d. to 9d. per lb.). Good cleaned, 31 to 33 cents (7¾d. to 8¼d.). Cleaned, second quality, 26 to 20 cents (6½d. to 5d.). Good uncleaned, 8½ to 9½ cents (2¼d. to 2¾d.). Ordinary, uncleaned, 6 to 7 cents (1½d. to 1¾d.).

In Java the cotton-tree furnishes an important by-product in the seeds, which are purchased by the Chinese with a view to extract the oil, which is used in the adulteration of the oil of peanuts. At Tegal and Kediri the preparation of this oil is carried on at some tobacco plantations. The proprietor of Wedari oil factory (in Japan) bought from the natives in 1895, about 4,000,000 of kapok fruits, and obtained from them 530 piculs of cleaned kapok and 1,000 piculs of seeds, which, added to 3,000 other piculs bought from the Chinese dealers, served for the preparation of 400 piculs of oil and 3,430 piculs of oil cake.

In Java the cotton-tree is held to be an excellent support for pepper plants, cubebs, &c. It is also employed as a shade tree in the coffee plantations. Again, in India it constitutes naturally excellent living telegraph posts, on account of the two following properties:—The wood is not attacked by the termite-ants, whilst, on the other hand, the horizontal and widely separated branches do not interfere with the wires.

THE COFFEE GLUT.

Coffee-growers in this State will be interested in the following remarkable item of news in *Planting Opinion*. It would seem that the proposal we mentioned some time ago to destroy a considerable portion (50 per cent., we believe was suggested) of the Brazilian coffee crop, owing to the glut in coffee and the low price obtained in the market.

Mr. Herman Sielcken, of the firm of W. H. Crossman and Bro., submitted last week an interview answering certain rumours afloat regarding the large fortune made by that firm from the bearish trend of the coffee market. In part Mr. Sielcken said—

"The publication about fortunes made on the bear side, or of bear raids and matters of that nature, is untrue in every detail. As far as I am personally concerned, or my firm is concerned, we have been doing the largest import business in coffee of late years; we neither take chances on the bull side nor the bear side, and we are buying and selling the coffee as nearly even as it is possible for any large dealers to do

"The decline in coffee is not the result of speculation. On the contrary, the speculation has been on the other side of the house. For six or seven years the coffee world at large has been bullish, and all the heavy capitalists of this country, as well as Europe, in and out of the coffee trade, who have become interested in coffee, have operated on the long side of the market. These interests in the consuming countries have been so large and the desire for higher prices so great that the Brazilians have been invited to send sensational bull news whether true or untrue. In other words, the dealers here and in Europe wanted to be deceived, and the Brazilians gave them false crop news year after year to such an extent as is hardly creditable to believe. Crops of 10,000,000 bags have been estimated at 6,000,000. A crop of 15,500,000 was represented as 10,000,000, and the present crop, which was represented as being a half-crop and very nearly destroyed by drought, turns out the second largest crop on record. The two crops of 1901-02 and 1902-03 amount to about 27,500,000 bags, while the five crops from 1891 to 1896 amounted to only 30,000,000 bags all told.

"So the low prices are the consequence of supplies, and are in spite of the strong bull speculation. There is no 4 c. coffee. If it were, according to my judgment, of good commercial quality, I would consider it cheap under all circumstances. The 4 c. coffee of the contract means 6 to 6½ c. commercial quality, as the quality tendered is 2 to 2½ c. higher in grade than No. 7, and instead of being worth 2 to 2½ c. higher to the consumer, it is not worth more than 1 c. more than No. 7.

"The coffee trade, as well as the outsiders, have repeatedly been caught by the apparent low price of coffee, and by all sorts of artificial measures to help the market. As every coffee merchant the world over knows, the Brazilians do not sell 4 c. coffee; they average over 6 c. in both Rio and Santos. Such a delusion on their part has been paid for so dearly that they will make up their minds that if Brazil continues to produce at this price the fact of their doing so contradicts in itself the theory that the price is low enough to decrease production. It should be proved by this time to the satisfaction of everybody engaged in the business that artificial means either by misrepresentation from the country of production or by speculation does not cure the evil.

"I have pointed out as far back as September, 1899, when prices were about on a par with the present, that nothing but a very low level can curtail the production of coffee, and evidently this level has not been reached so far. I am pointing out facts, as the low prices in 1899 have brought about larger crops than ever before, and the only solution of the question that I can see is a radical decrease in the production through low prices, which can only be reached by consuming markets using up the supplies on hand and not encouraging Brazilians to continue raising big crops by helping them with speculative ventures, such as has been the case the past four years."—*Tea and Coffee Trade Journal.*

COFFEE NOTES.

In expressing his views in reference to the destruction of 20 per cent. of the low-grade Santos coffee crop in Brazil, Mr. Sielcken said that this is an admission that the Brazilians deem it impossible to curtail the production in a legitimate way, in order to bring the supply and demand in closer proximity. This will no doubt lead to demoralisation among large operators and holders of coffee the world over. No positive results are likely, and it is an assured fact that the next crop will be a record-breaker.

Henry Nordlinger and Co., in a circular letter, says: "With a world's consumption of 15,500,000 bags of coffee, of which about 4,000,000 bags are supplied by other countries than Brazil, the production or exportable quantity of the latter country would have to be brought below the 11,500,000 mark to become of benefit to values. It is the surplus of production which makes the price for the crop.

Cable advices received from Nauman, Gepp, and Co., Santos, stated that the Bill has passed to destroy 20 per cent. of the coffee crop, and an option extra duty 300 réis on low qualities, to be enforced 1st July. As a result of the cable received from Santos regarding the destruction of 20 per cent. of the Santos crop, there was active covering in New York by shorts on the exchange, and prices advanced sharply.

The general belief in New York is that the next Brazil coffee crop will be a record-breaker, and amount to 15,000,000 to 20,000,000 bags. As a result of this enormous supply in view, bullish features, even at present low record prices, are slim.

Coffee touched the lowest prize-level on record this month, but the decline is not particularly significant. There was nothing else to expect under the circumstances, with thousands and thousands of bags in excess of consumptive requirements and production increasing in Brazil.

The movement of Central American coffee to market is freest at about this time of year, and doubtless the knowledge of this fact has had its due influence upon the general coffee market. It is probable that these grades will sell for lower prices shortly.

From Monday's low record of 3·85 c. per lb. for the May option, there was a moderate reaction in consequence of the receipt of a cable from Brazil, stating that a law has been enacted for the destruction of 20 per cent. of the coffee crop, to be enforced from 1st July next.

This news shows that the Brazilians realised the desperate state of affairs in the coffee trade, but it is not calculated to help matters at present. On the contrary, it may scare large holders, and cause serious demoralisation among operators, who will probably argue that the crop outlook must be very bearish when the Brazilian Government is thinking of resorting to such a desperate measure.

There are better ways of using that 20 per cent. of production than by burning or otherwise destroying it. If distributed free or at a nominal price in countries not largely addicted to coffee, the yearly consumption of the berry should profit, and the demand and supply soon be adjusted more equably.

This would also obviate the necessity of holding the coffee congress which Brazil has proposed to the coffee-producing nations for the purpose of taking measures for a general restriction of production.—*Merchants' Review.*

The *Tea and Coffee Trade Journal* commenting on the situation, and on its prediction of a rise in the price of coffee, goes on to say:—We acknowledge some density of mind in being unable to understand how this should be brought about except by some stratagem, which probably would not catch its fish, and ever since we have been waiting for results. The cat has now been let out of the bag, and we have seen with our eyes and heard with our ears how that at last the law has been passed by the Sao Paulo legislature to curtail the export of coffee in that province by the imposition of a duty on low-grade coffee that should make its export not worth while. One-fifth of the crop from that State would in this manner be eliminated from the coffee market of the world; 1st July was the day the law is to become effective, the rumour said. Observe the word rumour, for as yet, concerning this law, the commercial world wants authentic information. The expectation seemingly was that the coffee market would at once respond in a quick rise in prices, and for one day there was a rise of a few points. But presently, after a short duration of time had demonstrated that there were too many "ifs" in the way of an effective enforcement of the law, the market returned to its lowest conditions, and we have no doubt the Brazilians have been much surprised at an unappreciated and unresponsive world. But they may as well begin to learn now that although the consuming coffee world may be deceived part of the time and pretty much all of it in that part of the time, it is not going to be deceived all the time in part or in whole, and that kind of time has now arrived. All of the Brazilians must now learn that it is time to stop fooling themselves by fooling others. In the long run one reaps as one sows, and the Brazilians are now reaping their tares. The expunging of the low-grade coffee, as we pointed out last week, would be a good thing, but although the State of Sao Paulo may thus sacrifice its coffee (grown and picked, mind you!) it is not to be assumed that the other States in Brazil will not continue to export low-grade coffee, and probably in larger quantities on the inducement of higher prices. Hence we fail to see the ultimate good the restriction of export would bring about. Nor, again, of avail would be the restrictive agreement that may be reached by an international congress of growers, since it may be set down as a certainty that the large consuming countries, especially the United States, will not enter into such a compact. There is one immediate and unfailing remedy, and that is supplied by the law of supply and demand, and the sooner the Brazilians accept its severe but really kind ministrations the sooner will pass away their so-called "coffee crisis."

THE CULTIVATION AND PREPARATION OF GINGER.

The *Pharmaceutical Journal* for 14th March, 1903, contains the following summary of a paper by the late Mons. G. Landes, published in the *Journal d'Agriculture Tropicale* on the Cultivation and Preparation of Ginger. As some of our friends are growing ginger, and often write to us for information on the subject, we commend this article to their notice:—

The soil intended for planting with ginger should be well tilled and carefully weeded. This should be done before planting, for if much weeding be performed while the crop is growing water may come in contact with the rhizomes and cause them to rot. After planting, the soil is covered with banana fibre and farmyard manure. In dry situations irrigation must be resorted to, to ensure the requisite amount of moisture; in damp situations the soil must be carefully drained, for stagnant water is fatal to successful culture, the ginger under such circumstances being attacked by black rot, and the rhizomes acquire a bad odour and flavour. Commercial ginger consists solely of the rhizome, which must not be confused with the true root. The most esteemed ginger is that which has these rhizomes in the form of straight "fingers" regularly developed. This well-formed growth can only be obtained in soil which has previously been well worked. The harvest takes place as soon as the stems of the plant turn white. If left after this period, the rhizomes throw up aerial stems, and become tough and fibrous. The rhizomes must be lifted by a single thrust of a fork, so as to dig up the entire piece, all breaking and bruising being carefully avoided; this alone requires much practice to effect with precision. All adherent soil is at once carefully removed, together with the fibrous roots; if these be allowed to dry, the pieces of ginger cannot afterwards be obtained white, and are liable to become mouldy. They are then at once thrown into water and peeled. This peeling must be most carefully conducted, only the epidermis being removed, since the cells immediately beneath it are richest in essential oil and resin. This operation is generally conducted with a narrow-bladed, sharp-pointed knife, but some expert peelers use only the fingers. As soon as they are peeled, the rhizomes are thrown into water, which should be frequently changed if the ginger is to be of the best colour. The pieces peeled during the day are left in the water during the following night. Some planters add lime juice to this maceration water in order to obtain a white ginger, but the product thus treated is more subject to attacks of mould than that treated with water alone. Citric acid or vinegar might with advantage be substituted for lime juice. Another method is to throw the unpeeled ginger into boiling water, but the result is not so satisfactory as that obtained by cold maceration; although subsequent peeling is easier, this method is not employed in Jamaica. If boiling be prolonged, the ginger becomes dark in colour, and when dried forms the so-called black ginger. When the ginger after drying is not perfectly white, it is sometimes coated with chalk; sulphurous acid or bleaching powder are also sometimes used to bleach the product, but such chemical treatment is not to be recommended. After washing, the ginger is dried in the sun. On the large scale this is done in a "barbecue," a paved and cemented surface slightly convex, situated so as to obtain the maximum exposure to the solar rays. Small planters use a drying hurdle, formed of pieces of wood placed side by side and covered with banana or palm leaves. The ginger should be carefully turned over during the process of drying at least once daily. Six or eight days are generally required for the process, during which the ginger loses about 70 per cent. of its weight. Good ginger still retains 7 to 12 per cent. of moisture, as shown by drying at 100 degrees C., but in badly-dried specimens this may amount to 25 per cent. In some seasons this sun drying cannot be carried out, and the whole crop is, therefore, lost in consequence of attacks of mould. Attempts have been made to dry ginger without peeling it, but the product is black and worthless. The same ill success has attended the use of a desiccator, such as is used for fruit in North America. In China a totally different method of procedure is adopted. The ginger is rasped, so that it is obtained in the form of a powder, which is then dried and used [by the Chinese] as a condiment.

TOBACCO NOTES.

By R. S. NEVILL.

The Canadian Government now make a distinction between the duty on stemmed and unstemmed tobacco, charging 3d. more on the former. This is as it should be, as the local product is then fully protected from the cheaper worked tobacco from the United States and Cuba.

Since federation, the imports into Australia of unmanufactured tobacco from the United States, as reported by United States Department of Agriculture, have increased from 2,701,384 lb. in 1899 to 4,949,626 lb. in 1902, not including what is purchased in the English markets, which is considerable.

At Maysville, Kentucky, John E. Cahill is growing 2 acres of heavy or pipe tobacco under a shade of cheesecloth on posts 9 feet high. Thus far the experiment has been successful, as an investigation shows that a major portion of the leaves are without a spot or blemish of any kind.

Exhaustive experiments with tobacco as a mental stimulant, by M. M. Claparede, show that under its stimulation ideas flow easily and quickly group themselves.

A resolution in the Upper House of the Federal Parliament, to make a Government monopoly of the manufacture of tobacco, cigars, and cigarettes, was lost; the vote standing 13 to 13.

A feature of the English market this month is the continually increasing stocks, brought about, no doubt, by the Imperial Tobacco Company buying largely from the United States direct. It would seem that the tobacco trade is again shifting its channels, in order to adjust itself to the new conditions that are growing. Cigar tobaccos, so far, do not seem to be seriously affected by these new conditions.

Reports from the large stemming centres in the United States indicate that buyers are seeking other outlets for their tobacco; and, in consequence, the shipments to Great Britain will be greatly lessened, so far as first holders are concerned, though these tobaccos will sooner or later probably find their way there, *viâ* the Imperial Tobacco Company.

The United States Department of Agriculture is having experiments carried out to determine the effects of tobacco on the heart—chewers, pipe, cigar, and cigarette smokers, those who inhale and those who do not, are to be tested.

EDWARDS, GOODWIN, AND CO.'S MONTHLY TOBACCO REPORT.

27, Gradwell street,
Liverpool, 30th June, 1903.

Stocks—30th June, 1903 ... ... 115,531 hogsheads.

Prices.

STRIPS.	1903.	1902.
WESTERN—		
Fillers	— @ 5	— @ 5 @ —
Rather short	5¼ „ 5¾	5¼ @ 6
Very middling to middling	6 „ 6¾	6¼ „ 6¾
Good to fine	7 @ 7½ @ —	7 @ 8 @ —
BURLEY	5½ „ 8 „ —	6 „ 8½ „ —
VIRGINIA DARK—		
Fillers	5 @ 5½	5¼ @ 5¾
Rather short	6 „ —	6 „ 6¼
Very middling to middling	6½ „ 7½	6½ „ 7½
Good to fine	8 „ 10	8 „ —
VIRGINIA and CAROLINA BRIGHT—		
Semi-dark	6 „ 6½	— „ 8
Semi-bright	7 „ 8½	8½ @ 9 @ —
Medium or mixed ...	9 „ 10½	10 @ 11
Good to fine	11 @ 12 @ 14	11¼ @ 12¼ @ 14

LEAF.	1903.	1902.
WESTERN—		
Common export ...	— @ —	— @ —
African export ...	— @ 5 @ 6½	— @ 5 @ 6½
Short trade ...	— @ 4	4 @ —
Medium to good trade	4½ „ 6	4½ „ 6
BURLEY	6 @ 7 @ 8	7 @ 7½ @ 8
VIRGINIA DARK—		
Common export ...	— @ —	— @ —
Short trade	4 „ 4¼	— „ —
Medium trade ...	4½ „ 5	4 „ 5
Good to fine trade ...	5½ „ —	5½ „ —
VIRGINIA and CAROLINA BRIGHT—		
Common or semi-bright	— „ 6½	6 „ 7½
Medium or mixed ...	7½ „ 10	8½ @ 10 @ —
Good to fine	10½ @ 11½ @ 15	11 „ 12 „ 15

There has been a moderate general inquiry in the market throughout June.

In Westerns the chief interest centred in Clarksville Strips, some fair-sized sales—chiefly of the medium classes—being effected.

A firmer feeling was noticeable in Virginia and Carolina Brights, the growing crop being smaller than last year, and suffering from adverse weather conditions. The scarcity of labour in the Southern States and high price of cotton are likely to influence this growth also later on.

Forestry.

TIMBER TREES ON THE DAINTREE.

Mr. T. T. Pentzcke again sends us some of his interesting notes on the forests and scrubs of the North. Although now seventy-five years of age, fifty-two of which years have been spent in Australia, Mr. Pentzcke still takes a vital interest in the preservation of our valuable Queensland timbers for the sake of future generations. For the past six years he has been growing sisal hemp, having received nine suckers in 1897 from the late Mr. Cowley, who preceded Mr. Newport in the management of the Kamerunga State Nursery. Two years later he planted out 5 acres, and would now have 20 acres of plants, had he not unfortunately been overtaken by sickness. Once more on his feet, he tried to obtain an advance from the Agricultural Bank to purchase a "Raspidor" machine to prepare his hemp, but, as he says, although he could obtain an advance to enable him to commit what he calls an act of "vandalism," in the shape of ringbarking valuable timber, no advance could be made to help him to buy a machine worth about £40. We would draw Mr. Pentzcke's attention to the wording of the Agricultural Bank Act, which expressly states that advances will be made to settlers to enable them to effect improvements on their *land*, and ringbarking is an improvement as far as grazing lands are concerned. The most expensive timbers grow in the scrubs, such as cedar, pine, yellowwood, bean-tree, kauri pine, bunya pine, crow's ash, silky oak, &c. The trees subject to ringbarking are, as a rule, hardwoods, generally small in diameter, or, if large, short in stature, gnarled and twisted. A machine of any kind is not an improvement. It is a piece of portable property, which is really not an absolute security, and could not be accepted as such by an agricultural bank. The land and the permanent improvements thereon form the security.

With respect to the timbers which are so rapidly being destroyed as settlement progresses, we certainly agree with our correspondent that this is an evil which should, as far as possible, be prevented. The Forestry Department is doing its best, not only to prevent the indiscriminate destruction of timber, but to propagate the most valuable sorts. Unfortunately, the present state of the finances of the State will not admit of very vigorous action, but, when the end of the lane is turned, as there is every indication will ere long be the case, and more money is available, the question of conservation of forests will be one which will be taken in hand and dealt with in a manner which whilst not pressing hard upon the present generation, will preserve for posterity a most valuable heirloom in both old and new forests.

Mr. Pentzcke thinks it not worth while to write about the timbers and forests of the State, because there is now a Department of Forestry. In this he errs. No conservator of forests would object to information concerning the timber industry and the forest resources of the State. Such information by intelligent observers strengthens his hands and materially assists him in his important work. Taking this view, we are always glad when any light is thrown upon such subjects by whose who know what they write about.

In this connection we learn from Mr. Pentzcke, whose experience in forestry extends all over the Gulf and east coast country, that amongst a number of comparatively worthless trees in the Gulf country there is one—the black box, than which there is no better timber in the world for naves of wheels and other purposes demanding a strong timber impervious to weather. Already in 1866 this timber was getting scarce in the neighbourhood of Burketown, and he advises that its seeds should be collected and sown in well-drained soil containing a certain amount of lime. From Burketown to the Gilbert there is very little timber of any commercial value, until in the latter district the Leichhardt-tree and the pear-tree are found in considerable quantities. Then begins, what he considers, the champion wood of Australia—the ironwood. There is not a harder timber in existence, nor one more immune to decay. It is never attacked by insects of any kind. It has a beautiful satin-red colour, which is susceptible of a grand polish. It may be seen growing in the poorest rocky soil, but where it grows amongst the shelves of the sandstone rock it attains the size of the Indian teak, averaging 2 feet in diameter. The seeds of this tree, Mr. Pentzcke says, should be gathered by all who have the opportunity of doing so, and be forwarded to the Conservator of Forests. Blocks of this timber were used by him in building a bank at Maytown, and the timber is as sound as when it was first put in the ground. It was then worth £5 per 100 sup. feet, and some which was carted from Cooktown to the Palmer fetched 5s. per sup. foot.

In the palmy days of mining in the Far North, numbers of splendid iron wood-trees were destroyed by bark-getters, and 70 per cent. of the buildings in Maytown were of bark from this tree. As far as the black box is concerned, its only enemy is the firewood-cutter. The only enemy of young ironwood saplings is the aboriginal native, who uses them for spears, and cuts up the mature trees for wommeras Why could the latter not be induced to bring in the seeds on the days when the Government blankets are distributed to them?

On the Newcastle Range there is not sufficient humus in the soil to grow heavy timber, and the spinifex is the only protection against the washing away of the sandy soil between the rocks. North-east from the Range, and eastwards towards Cardwell, the magnificent scrubs are met with which stretch in an unbroken line from Ingham to Cairns. On its borders are seen gigantic gum-trees, and scattered through them, in vast profusion, splendid cedars, kauri pines, and Flindersias, and the only disease which attacks these trees is the cedar weevil, which only attacks diseased trees and sapwood. It would be advisable to plant the local bloodwood, red gum, ironwood, and black box together with cedar and pine. The cedar must be planted in the open, as it will not prosper in the thicket. The best spots for planting are open roads and timber tracks, where the young trees get the shade of stinging-trees and other broad-leaved trees.

The Indians and Japanese are excellent foresters. The former burn off the jungle to plant their rice, and then the forester puts in his young timber on the field, thus reducing expenses of forestry to a minimum. Here the scrub is burnt off, then the land is often left uncultivated, when a new growth of useless timber rapidly appears, and takes all the good out of the soil. This scrub growth does more injury to the land than twenty years of sugar-growing.

Some of this land was offered for sale or lease to some Japanese. They pointed to the undergrowth, shook their heads, looked up numerous tracks of wild pigs, which swarm in such country, and refused to have anything to do with it.

The gist of Mr. Pentzcke's letter is that on the Daintree there is a grand field for carrying out forestry work, and doubtless this has not escaped the notice of the Inspector of Forests, who has already been hard at work in the Atherton scrubs planting out young cedars in suitable localities.

Science.

DESTRUCTION OF THE WATER HYACINTH BY A NEW CHEMICAL PROCESS.

The pestiferous water hyacinth is still steadily making headway in various parts of Queensland, notwithstanding that large masses of it were swept away by a strong fresh in the Brisbane and Bremer Rivers in the latter part of last year. Our Queensland chemists do not take the same interest in its destruction as do their *confrères* in America, the reason probably being that Queenslanders have not yet realised the danger of the blocking up of the watercourses and lagoons by this weed, as has been the case with the rivers of Florida and Louisiana in the United States of America. From the *Scientific American* we take the following description of the evil on the St. John's River, and of the previous and latest attempts at its eradication. From this it would appear that at last a remedy has been discovered which has proved successful in destroying this beautiful pest.

In some cases it has seriously interfered with navigation and has completely blocked streams which had hitherto been available for the use of light-draft steamers.

The hyacinth has been especially troublesome in the St. John's River, where various schemes have been tried to destroy it. One of the plans was to equip a steamboat with a propeller provided with blades having very sharp edges, with the view of cutting away the growth below the surface. It was believed that this treatment would cause the plants to die, but the benefit was only temporary While lanes of open water were made by the action of the rapidly moving propeller, they were soon filled with the hyacinth, and the scheme was abandoned At some of the smaller wharves on the St. John's the growth has been so thick that it has been necessary to go out in boats and cut away with sickle and knife a large area in order to allow a vessel to moor at the dock, while some of the smaller wharves have been abandoned, as the plant grows so thickly about them that a boat driven by quite powerful engines is in danger of becoming blocked in the midst of a bed, unable to extricate itself.

The method which is now being tried, however, seems to have

SOLVED THE PROBLEM

of how to destroy the hyacinth, and it is believed that, if sufficient equipment is provided, eventually all of the southern watercourses may be cleared of the pest permanently. A chemical has been compounded which has such an effect upon the plant that if it comes in contact with the stem or blossom these portions soon wither; but the solution is so powerful that it works its way down the stem, killing the root as well. Some of the ingredients of the chemical are known only to the inventor, but a large quantity of acid is used in its preparatiod. The process of manufacture is very simple, the "laboratory" being placed on a barge provided with two large tanks, each of which has a capacity of 5,000 gallons. Connected with the tanks is a boiler in which the ingredients are mixed at a high temperature produced by steam heat. The barge is of such light draft that it can be towed by the spraying boat if desired, but the latter is provided with three reservoirs, each holding 3,500 gallons, which are filled by pumping from the barge. Pipes lead from the reservoir to a steam pump which supplies the spraying apparatus. This consists of three booms. One extends directly in front of the vessel, being supported by a block and tackle attached to the bow-deck. The others project from the sides of the vessel. The sprayers consists of hollow tubes which are perforated at intervals of about 1 foot, and the holes fitted with miniature nozzles. The liquid is forced into the sprayers through lines of hose which are connected to the sprayers by couplings in the usual manner. The arrangement of the sprayers is such that the chemical can be distributed over a space of 90 feet in width when the boat is moving. The boat containing the spraying apparatus is of the type of craft used on southern rivers, drawing but 4 or 5 feet of water. She is provided with very powerful engines in proportion to her size, in order to drive her through the masses of hyacinth, and is so modelled as to offer as little resistance to the obstruction as possible. The reservoirs carry a sufficient supply of chemical to cover about 100,000 square yards, and on a portion of the stream where the growth is not too rank the steamer will treat the area of surface in a day. In places where the side sprayers cannot be utilised on account of trees or other obstructions, the chemical is applied to the plants by means of ordinary hose operated by members of the crew.

Such is the destructiveness of the solution that, within a few hours after it is applied, the withering process begins, and microscopic tests prove that the liquid penetrates the growth below the water, killing the roots, as already stated. Portions of the dead growth which have been pulled from the bottom of the St. John's River, where the treatment has been applied, show that the effect of the chemical is to rot the fibre, and disintegrate it to such an extent that it no longer offers resistance to navigation. The solution kills the seed as well as the plant, and efforts are made to cover as much space during the seeding period as possible. The work has been done under the direction of the United States engineers.

A gentleman lately came to Queensland from the United States, where he had been engaged in the destruction of the water hyacinth, hoping to be able to destroy the prickly pear by means of a chemical used on the hyacinth. Whether he used the chemical here mentioned, we cannot say; but we understand that he found the same means had been employed here, and had not been attended with the success here recorded as affecting the water weed.

HOUSE ANTS.

Many remedies are proposed for cockroaches, ants, and other household pests, and whilst some persons find one effective, others pin their faith on another and regard all the rest as frauds and snares. It may be useful to publish some methods of destroying ants in houses which have been tested and found, by the writer, to give good results. The first is published in Bulletin No. 30, of the United States Department of Agriculture, Division of Entomology, page 97. Mix ten parts of sugar with 100 parts of water and boil: cool, and then add one part of tartar emetic and stir. Set this about in tins and other receptacles covered with muslin or wire netting, so that the ants can obtain access, but not domestic animals. This is a good method. A very similar one is to use, in exactly the same way, a mixture of 1 oz. of jam or syrup and the grains of finely-powdered corrosive sublimate. This is a useful poison, and makes the ants very sick.

Another simple remedy, involving no poison, is to soak a piece of sponge in sweetened water. Place this where ants are likely to be, and after some hours, when it is full of ants, drop it into boiling water and then sweeten it afresh for a second lot of ants. Ants are curiously intelligent when once they have grasped an idea.

The laboratory at the office of the department was at first infested with black ants that came in from outside. The use of poisoned jam, carbolic acid, and the molasses and boracic mixture soon taught them not to come in, and they now confine their operations to the outside of the building, in spite of the many temptations within, in the form of captive insects, food stuffs, &c. A small amount of perseverance and personal attention to the matter, with the use of good poisons, soon clears ants out of a building.—*Agricultural News*, Barbados.

Statistics.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE TOTAL RAINFALL FOR EACH MONTH OF THE YEAR IN THE AGRICULTURAL DISTRICTS OF QUEENSLAND.

STATIONS.	1902.					1903.							
	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.
North.													
Bowen	0·02	Nil.	0·06	0·06	3·16	1·66	7·65	16·44	1·44	2·04	2·77	0·31	0·22
Cairns	0·95	Nil.	0·16	1·38	5·15	21·32	10·28	32·51	15·50	1·67	0·51	0·87	0·44
Geraldton	1·77	Nil.	0·29	0·44	5·53	38·94	17·24	45·00	14·03	7·46	3·42	2·07	7·08
Herberton	0·08	Nil.	0·93	1·13	7·02	6·88	3·69	20·80	12·04	0·64	1·00	0·19	0·33
Hughenden	Nil.	Nil.	0·05	0·22	2·77	1·52	0·99	0·95	0·81	1·73	Nil.	0·07	0·31
Kamerunga	0·81	Nil.	0·29	1·57	3·79	20·36	10·82	37·45	19·32	2·14	0·50	1·10	1·50
Longreach	0·05	Nil.	Nil.	1·27	1·56	1·81	0·09	3·48	Nil.	3·51	Nil.	0·69	Nil.
Lucinda	0·45	Nil.	0·22	0·10	2·47	17·43	11·66	44·24	6·44	6·36	2·44	2·38	4·39
Mackay	0·80	Nil.	0·17	0·35	7·71	10·45	6·47	13·51	1·50	6·75	2·49	2·53	0·59
Rockhampton	0·09	1·41	0·05	0·51	5·60	0·92	1·68	3·73	1·12	6·93	0·08	3·73	0·68
Townsville	0·10	Nil.	0·29	0·08	6·50	4·66	8·11	19·80	1·61	2·08	1·02	0·05	0·19
South.													
Barcaldine	0·08	0·02	0·21	0·95	6·41	3·73	0·40	0·94	Nil.	4·92	Nil.	0·90	0·50
Beenleigh	0·49	0·28	2·92	3·36	1·83	1·88	4·77	6·49	1·90	12·40	0·92	5·04	2·26
Biggenden	0·04	1·58	2·34	0·25	8·98	2·25	3·15	3·95	0·16	1·28	2·07	3·90	1·62
Blackall	0·21	0·27	0·12	1·05	4 61	3·04	1·50	3·87	Nil.	5·19	Nil.	1·81	0·75
Brisbane	0·98	1·30	3·42	2·59	1·82	1·31	5·35	4·79	1·33	11·82	0·73	5·56	3·84
Bundaberg	0·13	0·31	1·24	0·65	1·38	0·97	2·60	6·05	0·38	11·55	0·33	5·98	0·88
Caboolture	0·05	1·09	2·30	3·17	1·74	5·15	3·42	9·59	1·39	16·14	0·92	6·08	3·27
Charleville	1·04	0·30	1·05	2·14	4·79	1·70	0·43	2·94	1·06	2·94	0·02	1·61	0·62
Dalby	0·41	0·70	3·14	2·79	3·29	1·28	1·22	4·89	1·33	6·00	0·03	3·78	2·30
Emerald	Nil.	0·02	0·01	1·58	8·42	2·30	2·49	1·48	0·26	3·43	0·02	0·57	0·24
Esk	0·15	0·64	0·93	4·00	7·67	1·32	3·51	4·46	1·25	9·27	0·30	2·97	4·21
Gatton College ...	0·64	0·73	2·41	3·72	5·14	3·68	3·81	2·60	0·79	7·55	0·17	4·15	2·50
Gayndah	0·05	0·64	2·10	2·08	3·37	0·77	2·08	2·30	0·09	6·03	0·05	2·81	1·06
Gindie	Nil.	0·10	Nil.	1·65	7·14	1·43	3·15	0·49	0·19	3·31	Nil.	0·51	0·30
Goondiwindi	1·19	0·21	1·50	0·89	2·21	1·84	0·72	4·40	1·73	5·07	0·15	4·38	2·09
Gympie	0·94	1·38	3·80	1·40	4·32	2·40	3·27	5·96	1·28	10·20	0·62	1·67	2·72
Ipswich	0·77	0·30	2·86	3·45	1·84	1·36	5·55	3·79	2·24	9·56	0·85	3·64	2·70
Laidley	0·40	0·89	2·21	3·27	5·13	0·71	3·63	2·63	0·95	8·20	0·20	4·65	3·06
Maryborough	0·57	0·69	0·91	1·11	4·02	2·09	2·76	3·23	0·66	9·58	1·60	6·17	1·09
Nambour	0·70	0·35	1·26	1·66	2·64	2·53	5·03	5·18	0·83	19·46	1·29	5·38	3·95
Nerang	1·22	1·17	3·15	1·75	1·73	3·36	4·73	4·84	3·04	15·75	2·36	7·34	2·21
Roma	0·46	0·35	0·92	0·86	2·35	0·75	0·15	2·48	0·39	3·17	0·34	2·26	1·13
Stanthorpe	0·94	0·95	2·29	3·98	1·75	0·23	1·59	0·95	1·18	6·87	0·74	4·71	1·98
Tambo	0·28	0·06	0·41	1·34	4·14	2·43	0·15	4·73	0·02	1·96	0·01	2·64	0·27
Taroom	0·17	0·45	0·68	1·40	2·88	4·32	1·53	1·29	0·82	8·83	0·23	3·83	2·21
Tewantin	0·85	0·87	1·94	1·96	1·35	1·90	5·30	11·52	1·80	20·22	7·42	7·09	5·70
Texas	1·57	0·13	2·42	1·67	1·42	0·18	0·94	0·48	1·84	4·34	0·36	4·53	3·21
Toowoomba	0·56	0·37	3·07	3·18	6·99	2·21	3·42	3·60	1·27	7·94	0·34	3·90	3·00
Warwick	0·94	0·43	2·96	2·87	4·61	0·68	2·59	2·13	0·73	8·62	0 10	5·45	2·63
Westbrook	0·29	0·38	3·20	3·34	3·37	4·21	2·70	1·52	0·34	4·23	2·53	3·89	1·63

EDGAR L. FOWLES,
For the Hydraulic Engineer.

PRICES IN BRITISH MARKETS OF ARTICLES WHICH CAN BE PRODUCED IN QUEENSLAND.

BUTTER.—Australian, choicest, 86s. to 94s.; second quality, 74s. to 84s.; Danish, 100s. to 104s.; Canadian, 88s. to 94s.; New Zealand, choicest, 97s.; finest, 86s. to 94s. per cwt.

CHEESE.—Canadian, 45s. to 48s.; New Zealand, 48s. to 52s. per cwt.

CONDENSED MILK.—18s. 6d. to 20s. 6d. per case, in 20-case lots.

SUGAR (duties, raw, 2s. to 3s. 10d. per cwt.; refined, 4s. 2d. and ¼ per cent.).—Refined, £18 to £18 10s.; raw, £14 to £16 per ton; German beet, 88 per cent., 8s. 5d. per cwt.

MOLASSES (duty, 2s. per cwt. and ¼ per cent.).—5s. 6d. to 8s. per cwt.

Rice (duty 5d. per lb.).—Rangoon, £9 to £15; Japan, £13 to £17; Java, £20 to £25; Patna, £18 to £22 per ton.

Coffee (in bond, duty 1½d. per lb. and ¼ per cent.).—Ceylon plantation, 40s. to 120s.; peaberry, 60s. to 123s.; Santos, 25s. to 46s.; Mocha, 50s. to 100s.; Jamaica, finest, 90s. to 130s. per cwt.

Chicory Root, dried (duty paid)—24s. to 27s. per cwt.

Arrowroot.—St. Vincent, 2d. to 5d.; Natal, 6d. to 7d.; Bermuda, 1s. 3d. to 1s. 6d. per lb.

Wheat.—Duluth, 33s. per 496 lb.; English, 30s. 6d. to 31s. 6d. per 504 lb.

Flour.—20s. 6d. to 30s. 6d. per 280 lb.

Malting Barley.—English, 27s. 6d. to 27s. 9d. per 448 lb.; grinding, 22s. to 24s. per 416 lb.

Oats.—New Zealand, 26s. to 28s. per 384 lb.; Canadian, 28s. to 31s. per 320 lb.

Split Peas.—43s. per 504 lb.

Ginger.—Jamaica, 55s. to 65s.; Cochin, 70s. to 80s.; Japan, 27s. to 30s. per cwt.

Vanilla.—3s. to 7s. per lb.

Pepper.—Capsicums, 16s. to 75s.; chillies, 30s. to 36s. per cwt.; black, 6d. to 6⅝d.; white, 9¼d. per lb.

Green Fruit.—Apples, Australian, 9s. to 15s.; Tasmanian, 9s. to 15s. per case; bananas, 8s. to 13s. per bunch; pineapples, 3s. to 6s. each; Australian, 8s. to 12s. per case; oranges, Valencia, 10s. to 11s. for common, to 14s. for finest selected, per 420; lemons, Naples, finest, 10s. to 12s. 6d. per 420.

Dates.—Tafilat, 45s. to 50s. per cwt.; Persian, 8s. 6d. to 14s. 6d. per case; Egyptian, 20s. to 35s. per cwt.

Cotton.—Uplands, 6d. to 6½d. per lb. Italian spinners offer 8½d. per lb. for Cairns cotton, and have ordered 6,000 bales if procurable.

Cotton Seed.—£6 10s. per ton.

Cotton-seed Oil Cake (decorticated).—£6 5s. to £6 12s. 6d. per ton.

Cotton-seed Oil.—Crude, £21 10s. per ton.

Linseed.—35s. to 45s. per 416 lb.

Linseed Oil Cake.—£6 5s. to £6 10s. per ton.

Linseed Oil.—£20 to £20 10s. per ton.

Olive Oil.—£31 10s. to £33 per tun (252 gallons).

Copra (cocoanut-kernel).—£15 10s. to £16 per ton; £8 to £9 per ton at the S. S. Island trading stations. Corresponding value in Queensland, £10 to £12 per ton.

Cocoanut Oil.—£25 to £33 10s. per ton.

Lucerne Seed.—56s. to 60s. per cwt.

Manilla Hemp.—£25 to £30 per ton.

New Zealand Hemp.—£33 10s. per ton.

Sisal Hemp.—£35 per ton.

Flax.—£48 to £52 per ton.

Tapioca (duty, 5d. per cwt.).—Pearl, 12s. 6d. to 13s. 6d. per cwt.

Frozen Meat.—The following are the Frozen Meat Trade Association's Smithfield market quotations for the undermentioned classes of frozen meat, based on actual sales of not less than 100 carcasses of mutton or lamb, or 25 quarters of beef of fair average quality. These quotations are not for selected lines, but for parcels fairly representative of the bulk of the shipments now on the market:—

New Zealand Sheep.

(Crossbred Wethers and Maiden Ewes.)

	Sept. 12.	Sept. 19.
Canterbury, light (48 lb. to 56 lb.)	$4\frac{1}{4}$d.	$4\frac{1}{4}$d.
Canterbury, medium (56 lb. to 64 lb.)	$4\frac{3}{16}$d.	$4\frac{3}{16}$d.
Canterbury, heavy (64 lb. to 72 lb.)	$4\frac{1}{16}$d.	$4\frac{1}{8}$d.
Dunedin and Southland (56 lb. to 64 lb.)	$4\frac{1}{8}$d.	$4\frac{1}{8}$d.
North Island (55 lb. to 65 lb.) ...	4d.	$4\frac{1}{16}$d.

Australian Sheep.

(Crossbred and Merino Wethers.)

Heavy (over 50 lb.)	None offering.	
Light (under 50 lb.)	None offering.	

River Plate Sheep.

(Crossbred and Merino Wethers.)

Heavy (over 50 lb.)	$3\frac{15}{16}$d.	$3\frac{7}{8}$d.
Light (under 50 lb.)	$3\frac{15}{16}$d.	$3\frac{7}{8}$d.

New Zealand Lambs.

Canterbury, light (28 lb. to 36 lb.)	$4\frac{7}{8}$d.	$4\frac{7}{8}$d.
Canterbury, heavy (36 lb. to 42 lb.)	$4\frac{7}{8}$d.	$4\frac{7}{8}$d.
Dunedin and Southland (28 lb. to 42 lb.)	$4\frac{3}{4}$d.	$4\frac{3}{8}$d.
North Island (28 lb. to 42 lb.)	$4\frac{5}{8}$d.	$4\frac{5}{8}$d.

The weakness in the market is chiefly due to the damaged condition of the cargoes by the "Perthshire" and "Banffshire."

Australian Lambs.

30 lb. to 40 lb.	None offering.	

River Plate Lambs.

30 lb. to 40 lb.	None offering.	

New Zealand Frozen Beef.

Ox, fores (180 lb. to 220 lb.) ...	$2\frac{1}{2}$d.	$2\frac{5}{8}$d.
Ox, hinds (180 lb. to 220 lb.) ...	4d.	$4\frac{1}{8}$d.

Australian Frozen Beef.

Ox, fores (160 lb. to 200 lb.) ...	None offering.	
Ox, hinds (160 lb. to 200 lb.) ...	None offering.	

River Plate Frozen Beef.

Ox, fores (160 lb. to 220 lb.) ...	$2\frac{7}{16}$d.	$2\frac{7}{16}$d.
Ox, hinds (160 lb. to 220 lb.) ...	$3\frac{15}{16}$d.	$3\frac{15}{16}$d.

(All quotations for beef are nominal.)

EGGS.—French, 10s. to 11s. 6d.; Danish, 7s. to 9s. 6d. per 120.

BACON.—Irish, 62s. to 68s.; American, 50s. to 53s.; Canadian, 59s. to 63s. per cwt.

HAMS.—Irish, 76s. to 88s.; American, 62s. to 66s. per cwt.

TALLOW.—Mutton, fine, 29s. 6d.; medium, 28s. per cwt.; beef, fine, 30s.; medium, 28s. per cwt.

LOCAL MARKET PRICES OF MARSUPIAL SKINS.—Kangaroo—red and grey, large, 43s. to 48s.; medium, 24s. to 30s.; small, 9s. to 21s. per dozen; very small, 2s. to 5s. Wallaby—large to extra large, 11s. to 19s.; medium, 6s. to 9s. 6d.; small, 1s. 9d. to 5s. Opossums—large, 9s. to 12s. 6d.; medium, 6s. to 9s.; small and rumped, 2s. 6d. to 6s. Bears—large, to 10s.; medium, to 8s.; small, 1s. to 5s. per dozen.

Agricultural Patents.

PATENTS ACCEPTED.

6870: James Smith, of "Inglewood," Niangala, New South Wales, sheep farmer. "A Tree and Stump Extractor." Dated 19th September, 1902.

7136: James McGrath, of Peak Station, Onslow, Western Australia, pastoralist. "Thumb Rest and Guard Attachment for Sheep Shears." Dated 24th February, 1903.

7149: Charles John Andersen, of Marion, near Mackay, Queensland, Australia, blacksmith. "Improvements in Truck-carrying Drays." Dated 3rd March, 1903.

Times of Sunrise and Sunset, 1903.

Date.	September.		October.		November.		December.	
	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1 ...	6·6	5·31	5·31	5·45	5·1	6·3	4·50	6·24
2 ...	6·5	5·32	5·30	5·46	5·0	6·4	4·50	6·24
3 ...	6·4	5·33	5·29	5·47	4·59	6·5	4·50	6·25
4 ...	6·2	5·33	5·28	5·47	4·59	6·5	4·51	6·25
5 ...	6·1	5·33	5·27	5·47	4·58	6·6	4·51	6·26
6 ...	6·0	5·34	5·26	5·48	4·58	6·6	4·51	6·27
7 ...	5·59	5·35	5·24	5·48	4·57	6·6	4·51	6·28
8 ...	5·58	5·35	5·23	5·49	4·57	6·7	4·51	6·29
9 ...	5·57	5·35	5·22	5·49	4·57	6·7	4·51	6·30
10 ...	5·56	5·36	5·22	5·50	4·56	6·8	4·51	6·31
11 ...	5·55	5·37	5·21	5·50	4·55	6·9	4·51	6·32
12 ...	5·53	5·37	5·21	5·50	4·55	6·9	4·51	6·32
13 ...	5·52	5·38	5·20	5·50	4·53	6·10	4·51	6·33
14 ...	5·51	5·38	5·19	5·50	4·53	6·10	4·51	6·33
15 ...	5·50	5·38	5·18	5·50	4·53	6·12	4·52	6·34
16 ...	5·48	5·38	5·17	5·52	4·53	6·13	4·52	6·34
17 ...	5·47	5·39	5·16	5·52	4·52	6·14	4·53	6·35
18 ...	5·46	5·40	5·15	5·52	4·51	6·15	4·53	6·35
19 ...	5·45	5·40	5·13	5·52	4·50	6·16	4·54	6·36
20 ...	5·44	5·40	5·13	5·53	4·50	6·17	4·54	6·37
21 ...	5·43	5·41	5·12	5·55	4·50	6·18	4·54	6·38
22 ...	5·42	5·42	5·11	5·56	4·50	6·18	4·54	6·38
23 ...	5·41	5·43	5·10	5·57	4·50	6·19	4·55	6·39
24 ...	5·40	5·43	5·9	5·57	4·50	6·20	4·55	6·39
25 ...	5·39	5·43	5·7	5·57	4·49	6·21	4·56	6·40
26 ...	5·37	5·43	5·6	5·58	4·49	6·21	4·57	6·41
27 ...	5·36	5·44	5·5	5·59	4·49	6·21	4·57	6·41
28 ...	5·35	5·45	5·4	6·0	4·49	6·21	4·57	6·41
29 ...	5·34	5·45	5·4	6·1	4·49	6·22	4·58	6·41
30 ...	5·33	5·45	5·3	6·1	4·49	6·23	4·59	6·41
31 ...	...	...	5·2	6·1	...	...	4·59	6·41

Phases of the Moon.			H.	M.
6 Sept.	○	Full Moon	12	19
14 „	☾	Last Quarter	1	13
20 „	●	New Moon	16	39
28 „	☽	First Quarter	1	8
6 Oct.	○	Full Moon	3	23
13 „	☾	Last Quarter	7	56
20 „	●	New Moon	3	30
27 „	☽	First Quarter	20	32
4 Nov.	○	Full Moon	17	27
11 „	☾	Last Quarter	14	45
18 „	●	New Moon	17	10
26 „	☽	First Quarter	17	36
4 Dec.	○	Full Moon	6	12
10 „	☾	Last Quarter	22	53
18 „	●	New Moon	9	25
26 „	☽	First Quarter	14	22

General Notes.

NITROGEN FROM THE AIR.

Many experiments have been made with the view of extracting nitrogen from the atmosphere in the interests of agriculture, but hitherto the methods adopted have proved somewhat too expensive to make the result commercially profitable. A new process is now announced in the *Agricultural Gazette*, London, which has been introduced by Dr. Gerlach and Professor Wagner, and a company has been formed to manufacture manure under the method in Berlin. It has long been possible to extract the nitrogen; but the difficulty has been to do it cheaply enough to pay. Whether the German chemists have succeeded in meeting this obstacle to the sale of nitrogenous manure obtained from the atmosphere, so far as its nitrogen is concerned, remains to be proved If a very cheap method were invented, supposing it to be a possibility, the benefit to agriculture would be incalculable.

HOMEMADE JAMS.

As the mango season will arrive before long, and tomatoes and bananas are always with us, the following recipes for utilising them, as given in the *Tropical Agriculturist*, Ceylon, last year, may be useful to our lady readers :—

Green Mango Jelly.—Peel, cut, and stone the fruit. Put each piece, as cut, into water slightly acidulated with limejuice or it will discolour. When all is cut up fairly small, drain, dry, and put into a preserving pan, with just enough water to cover it. Put on the lid, and let it simmer, as for guava jelly, but the fruit being green takes much longer to get soft and squashy. When quite pulpy let it drip through flannel, but do not squeeze it at all. Weigh the juice, allow $1\frac{1}{2}$ lb. of sugar to every pound of juice and boil together till it jellies.

If made from ripe mangos only use $\frac{3}{4}$ lb. of sugar to each pound of juice, and the first boiling will not take very long. When cutting the ripe fruit, too, do so over the preserving pan, to save all the juice, and do not put the pieces into water until you are going to boil them.

Jam from Green or Ripe Mangos.—These are made alike, only the green wants more sugar. Grate or cut up the fruit after peeling and stoning it. Boil gently till quite soft or pulpy, and all in a mash ; if preferred, it can be put through a sieve. Weigh, and to every pound of green mango pulp allow $1\frac{1}{4}$ lb. of sugar. If ripe fruit is used allow only $\frac{3}{4}$lb. Simmer gently till thick.

Plantain Jam.—This is much liked by children, and is easy to make. The fruit soon softens with boiling. I always sieve it. Add $\frac{1}{2}$ lb. of sugar and the juice of two limes to every pound of pulp. Boil together till firm ; it often turns quite a pretty pink.

Plantain Jelly.—Take about thirty large, coarse, very ripe plantains ; wash them well ; add four pints of water, and boil for two hours ; uncover ; strain, but do not squeeze. To eight cups of the juice allow five cups of sugar and the juice of three limes ; boil until it jellies. It is not clear, but a nice red colour. If a few guavas, about six big ones, are added to the plantains and all boiled and strained together, it makes a nice variety.

Tomato Jelly.—To each pound of tomatoes allow 2 oz. sugar. Melt the sugar, stirring all the time, taking care it does not burn. Into this put two or three Bombay onions cut up very fine for each pound of fruit, and boil up nicely. Add the tomatoes cut up fine, a little pepper and salt, and, if liked, some spice. Boil all to a pulp, strain, and then boil up the juice till it jellies. Put into small pots, as it does not keep well when once opened. This is a savoury for use with meat which is not much known.

A GOOD CUP OF COFFEE.

The secret of making palatable, non-injurious coffee lies in the two words: quick infusion.

In the first place, have the coffee ground to the finest powder, so that its full virtue may be quickly extracted. Allow a dessert-spoonful for each person, mix it with just enough cold water to make it thick paste, and let it stand until five minutes before the time to serve. Have fresh water boiling, pour on a cupful for each person, and two more for the persons who are likely to (but should not) wish a second cup. Put the cup over the fire and let the infusion come to a boil, settle with a dash of cold water or a clean egg-shell, and serve immediately. This is a cup of coffee and not a cup of tannin. Coffee made in this way may be taken morning, noon, and night without injury, but the quantity drunk at one time should not be greater than one cupful.

Coffee that has boiled or stood more than 5 minutes should be thrown away.

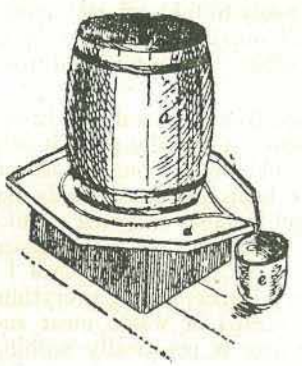
INFUSING TEA.

The Japanese treat tea much as we treat coffee. They grind the leaves in a portable mill, reducing them to a fine powder, which is then mixed with hot water to about the consistency of Turkish coffee or a fine pulp. The Chinese and Japanese methods of infusing or drawing tea prevent the tannic acid or astringent principle from forming part of the beverage, but extract all of the more volatile and stimulating properties of the leaves. Tea should never be boiled.

Tea is the drink of drinks to the real connoisseur, the tea-lover who is most competent to judge of merits of the world's beverages. Nothing can take its place, and it soothes, refreshes, and strengthens. Good tea, properly made and drunk in moderation, never does harm. Strange that coffee is attacked by owners of coffee surrogates while tea's virtues are taken for granted.

HOMEMADE SOAP FOR THE FARM.

There is wasted annually on the average farm enough material to make two barrels or more of soap each season. In my long experience in the country I have found it not only profitable but very convenient to have a good supply of homemade soap ready for use at all times. I begin my operations in the



autumn by saving all the wood ashes from the stoves and fireplaces. They should not be mixed with coal ashes, otherwise the lye obtained from them will be of a dark colour and not desirable. The ashes are kept in a barrel in a dry place. Before being dumped in the homemade leach barrel, however, they are allowed to stand in an old pail or tin vessel for a day or longer until there is no danger of fire being transferred to the wooden barrel, which is kept in a building near by. I usually make my soap in the spring, as I then have an accumulation of the winter's meat scraps for use.

In preparing the leach, a large barrel with both ends knocked out will serve the purpose. As a base upon which to set the barrel, a large flat stone with a groove around the edge leading to a central draining point can be used to good advantage, but the bottom of an old stove will serve the same purpose. Several boards nailed tightly together with a cleat nailed around the edge, so as to conduct the lye to the dripping point (as shown in the figure), make a good foundation. The drain, of whatever material it is made, should be placed on a firm foundation and slightly tilted forward. The barrel should be placed upon it, and a few pieces of wood or sticks scattered in the bottom. These should be covered with straw 6 to 8 inches deep, over which should be sprinkled 1 or 2 gallons of airslaked lime. The ashes should be tested before being placed in the barrel. I usually test them in the following manner:—I wet my finger, touch it to the ashes, and then place it to my tongue. If of good quality, the sensation on the tongue is quite sharp, although not painful. If tasteless and no biting sensation is experienced, they are of no value and should not be used. The barrel should be filled and packed lightly. A few quarts of water poured in occasionally will assist considerably and help pack them more securely. The barrel is filled to the top, leaving a depression in the centre, so that water can be poured in as needed. A barrel properly prepared will usually begin running the same day, but some people prefer to wet slightly and allow to stand a week before starting the lye. One barrel of good ashes ought to make 12 gallons of strong lye and 12 gallons of weak lye, the latter being used to fill in as described below; when the soap is being completed I usually test the lye with a fresh egg. If it is of the proper consistency, the egg will float, but if it is weak it will sink.

Preparing the Grease.—In a large iron kettle I put about 12 lb. of grease, such as is left after trying out lard, beef-drippings, tallow, spoiled lard, or butter or anything of that character, which is always kept in a cold place or in a tight can or other vessel. The grease is heated thoroughly, and a gallon of strong lye is added. This is slowly boiled for half an hour, after which two gallons of strong lye are poured in and cooked for some time. If it is in good condition, it will boil up soapy in a short time, and is all right. Add more strong lye if needed, and fill in gradually with the weak lye. Take out a little from time to time, and test it in a saucer. When cool, it gets jelly-like or rather thick, and is then ready to take off and store away. It can usually be tested by taking a small quantity of water in a saucer. If it does not thicken readily, add a little rain water, and test until of the consistency desired.

From the lye obtained from a barrel and 12 lb. of grease, I usually make 15 gallons of first-class soap. I usually pour it while hot in a large wooden barrel, after which it should be thoroughly stirred. It will cool, and be of uniform thickness. It is kept in a moderately cool cellar. It will keep in other places, but the barrel is liable to spring a leak if exposed to the weather, so care must be taken to have it in a protected place. I have frequently made two barrels of soap in one day. In such a case I usually have two or three barrels, and run my lye in advance, having everything ready for the work. The materials used are simply scraps of waste meat such as accumulate on every farm, and the cost of making is practically nothing, as I do not consider the labour of money value.

More than half the farmers' wives in this vicinity throw away the meat scraps and ashes, and buy their soap. I prefer mine to any soap upon the market at the present time for farm use. I have no difficulty in selling my soap when I make a surplus. It makes an excellent wash for old harness, collars, and other farm implements.—*Station, Farm, and Home.*

DRINKING AN ORANGE.

Many years ago a French gentleman named Thozet had a large orchard of fine citrus fruit trees at North Rockhampton. One day he invited us to have some oranges, and we were about to eat one in the usual way when he said "Ah! The barbarous European way of enjoying an orange. You should drink an orange, not eat it." He then peeled one as one would peel an apple, leaving, however, the tough, white, inner skin untouched. Then he cut a hole in the top of the peeled fruit. "There," he said, "now, squeeze and drink." We did so, and made the discovery that the only true way to enjoy an orange is to drink it. We had not seen or heard of this method anywhere, until we noticed, in the April issue of the *Bulletin of Miscellaneous Information* of Trinidad, a paragraph entitled "Drinking an Orange," in which the process is described as above.

TO MAKE POOR HAY PALATABLE.

When hay has been badly saved or otherwise is of inferior quality, many people are apt to consider it valueless and either scatter it in the farmyard for manurial purposes or get rid of it in some fashion. If hay has been well saved, it possesses a fine and attractive aroma, and on the principle that "good wine needs no bush" it does not require any artificial means to induce stock to eat it. Most people like to see hay of a green colour, but we have seen both horses and dairy cattle prefer an almost black lucerne hay to the more attractive green. There is a very simple method of rendering poor hay palatable; and that is, by sprinkling it with salt when building the stack. All farm animals are fond of salt, and this addition to the hay imparts to it not only the salty flavour, but also a kind of aroma which induces them to eat it as greedily as if it had been properly saved.

QUEENSLAND CHAMBER OF AGRICULTURE.

We have received from the Secretary of the Queensland Chamber of Agriculture the Second Annual Report of the Institution. It is rather too lengthy to be published here in its entirety. In his address, the President (the Hon. A. J. Thynne) dealt with the recent drought, the growth and transport of grain, the dairying interests, fruit-growing and marketing, and other interesting topics. Various matters of importance to farmers and fruit-growers have been satisfactorily dealt with during the past year, and the Chamber recognises the sympathetic assistance in various matters afforded by State Ministers. The report may be obtained on application to the secretary, Mr. F. W. Peek, at his office, Market street, Brisbane.

AGRICULTURAL AND HORTICULTURAL SHOWS.

The Editor will be glad if the secretaries of Agricultural and other Societies will, as early as possible after the fixture of their respective shows, notify him of the date, and also of any change in date which may have been decided on.

Answers to Correspondents.

MANGE IN DOGS.

Doggie, Nanango.—Try the following remedy:—Soft soap, 4 parts; B-naphthol, 1 part; storax, 2 parts; tobacco extract, 3 parts. To be applied to one-third of the skin, at the most, for three consecutive days. After three applications, wash the whole body, using carbolic soap.

CLEANING ENAMELLED MILK PANS—MANURE FOR AZALEAS.

A.S.L., Lowmead—

1. Try Fuller's earth beaten to a very fine powder carefully cleared of all rough substances.

2. The best all-round manure is farmyard manure. If liquid be used, 1 gallon to 5 gallons of water is strong enough. You may also use 1 peck of soot in a 40-gallon barrel of water. Stir every day for four days, then use the water in a clear state.

We would ask our correspondents to be good enough to write their names distinctly, and also to name their post town. We have failed to read your signature.

CATERPILLARS DESTROYING CABBAGES.

Gabriel Kirk, Moonmera.—You evidently do not read your *Journal.* The recipe you ask for is given on page 294 of the last issue of the *Journal.*

HOMEMADE HORSE POWER.

A Cockie, Yandaran.—Write to Mr. Brünn, Pimpama Island. He uses a very ingenious homemade kind of whim, which would evidently suit your purpose.

PUMPKINS FOR PIGS.

W. Hobart, Wyeela.—Pumpkins, both raw and boiled, are good feed for pigs. Cattle and table pumpkins are equally good.

ANGORA GOAT.

Tom Black, Minnie Vale.—Write to Mr. H. Missing, Tiaro. He has a fine herd of Angoras, and young bucks will shortly be ready for sale. About £5 5s. is the price of an Angora buck.

PIGS TRESPASSING—EARTH FLOORS.

A. S. L., Lowmead.—

1. Give notice to the owners that if the trespass is not discontinued the pigs will be destroyed. We once destroyed forty odd pigs which trespassed on our canefields. The owners could not be identified. But notice was previously served on all who kept pigs in the neighbourhood.

2. Linoleum would not be suitable. Why not use asphalt or cement?

COST OF CUTTING WHEAT.

A correspondent asks the cost of cutting wheat when reaper and binder have to be hired. We are indebted to Mr. W. D. Lamb, Yangan, for the information here supplied:

1. If the owner of the binder finds one set of horses and the grower another set, changing half a day about, and the owner finds the twine, the charge is 7s. 6d. per acre.

2. If the owner finds one set of four horses and the grower a second set and twine, the charge is 4s. per acre. These were the general charges at last year's harvest.

The Markets.

AVERAGE PRICES FOR FRUIT—ROMA-STREET MARKETS.

Article.	AUGUST. Top Prices.
Apples, Eating, per case	6s. to 8s. 6d.
Apples, Cooking ,,	6s. to 7s. 6d.
American Pears, per half-case	8s.
Apples, American, Green ,,	...
Lemons, Italian, per 360	...
Lemons, Italian, per 180	...
Lemons, American, per 180	...
Lemons, New South Wales, per case	4s. 6d. to 5s. 6d.
Oranges, Italian ,,	...
Oranges, Local ,,	4s. 6d. to 5s. 6d., rising.
Oranges, Sydney, (packers) ,,	4s. 6d. to 5s. 6d.
Mandarins, Local ,,	6s. to 7s.
Mandarins, Sydney (packer) ,,	7s. to 8s.
Apricots, New South Wales, boxes (half-gincase)	...
Apricots, Queensland, half-case	...
Plums, half-gincase	...
Peaches, half-gincase	...
Nectarines, half-gincase	...
Gooseberries, English	...
Cherries	...
Passion Fruit, quarter-case	3s.
Mangoes	...
Pineapples, rough, per dozen	9d. to 1s.
Pineapples, Queen ,,	2s. to 3s.
Melons	...
Rockmelons	...
Bananas, per bunch	*6d. to 2s. 6d.
Bananas, per dozen	1½d.
Tomatoes, quarter-case	2s. to 2s. 6d.
Pawpaw Apples, case	...
Custard Apples, quarter-case	...
Granadillas, case	...
Seville Oranges, apple-case	3s. 6d. to 4s. 6d.
Cape Goosberries, quarter-case	2s. to 2s. 6d.
Pears (Melbourne), export case	...
Pears (Tasmanian), quarter-case	...
Rosellas, per sugar-bag	...

* According to size.

AVERAGE TOP PRICES FOR AUGUST.

Article.		AUGUST. Top Prices. £ s. d.
Bacon	lb.	0 0 7⅝
Bran	ton	3 15 0
Butter, First	lb.	0 1 1½
Butter, Second	,,	0 0 9½
Chaff, Mixed	ton	3 18 9

AVERAGE TOP PRICES FOR AUGUST—*continued.*

Article.		AUGUST. Top Prices.
		£ s. d.
Chaff, Oaten	ton	5 15 0
Chaff, Lucerne	"	3 17 6
Chaff, Wheaten	"	4 15 0
Cheese	lb.	0 0 7¼
Flour	ton	12 5 0
Hay, Oaten (Imported)	"	7 0 0
Hay, Lucerne	"	2 12 6
Honey	lb.	0 0 2¾
Rice, Japan (Duty paid)	ton	23 0 0
Maize	bush.	0 3 3
Oats	"	0 4 0
Pollard	ton	4 10 0
Potatoes	"	5 18 9
Potatoes, Sweet	"	1 16 3
Pumpkins	"	1 10 0
Sugar, White	"	21 10 9
Sugar, Yellow	"	18 0 0
Sugar, Ration	"	14 10 0
Wheat	bush.	0 5 9
Onions	cwt.	0 4 6
Hams	lb.	...
Eggs	doz.	0 0 9¼
Fowls	pair	0 4 4½
Geese	"	...
Ducks, English	"	0 4 9½
Ducks, Muscovy	"	0 5 9¼
Turkeys, Hens	"	0 9 7½
Turkeys, Gobblers	"	0 17 11¼

ENOGGERA SALES.

Article.	AUGUST. Top Prices.
	£ s. d.
Bullocks	10 18 9
Cows	8 17 6
Wethers, Merino	1 0 8¼
Ewes, Merino	0 14 3¾
Wethers, C.B.	1 1 5¼
Ewes, C.B.	...
Lambs	0 15 0
Pigs	...

Orchard Notes for October.

By ALBERT H. BENSON.

Keep the land well cultivated, and, if dry, see that it is well stirred, but not turned. Attend to the disbudding of all young trees, for, if superfluous growths are checked now, they are converted into fruit-wood, and the vigour of the tree is thrown into those shoots which are to form the future branches of the tree. Disbud all vines, rubbing out all superfluous shoots, leaving only as many canes as the vine is strong enough to mature fruit to perfection on.

Sulphur all vines to prevent oïdium, as, if there is any muggy weather during the month, this disease is sure to make its appearance. Where Black-spot is present, spray the vines with Bordeaux mixture; and if caterpillars are troublesome as well, then add 1 oz. of Paris green to each 2 gallons of Bordeaux mixture, and both pests will be destroyed by the one spraying. When using Bordeaux mixture there is no necessity to use sulphur for oïdium, as the Bordeaux mixture answers equally as well. Don't spray when the vines are in blossom; but with varieties that are shy setters it is often a good plan to sulphur when in blossom.

The nursery should be carefully attended to; where not already done the ties of all grafts should be cut and the scions should be trained so as to make a single upright stem. Where buds have been put in, they should be started by cutting back the stock sufficiently to cause them to grow, but the stock should not be cut hard back all at once, but by degrees, always leaving a portion of the stock above the bud to tie the young shoot to. Plant pines and bananas during the month, selecting suckers from healthy plants and from plants that are good croppers, and that produce good fruit, as a careful selection of suckers always pays well. Continue the treatment for Maori or Rust Mite of the orange recommended in the Notes for September; and where orange bugs, either the green or bronze, are present, destroy every mature insect that can be found, so as to prevent them breeding, as the killing off of the first crop will materially lessen their number for the season. Hand-picking, though slow, is probably the best remedy, though, before the insects are fully grown, large numbers may be destroyed by driving them on to the main branches of the trees and sweeping them off with a broom on to a cloth, from which they can be gathered and killed. Take every possible precaution against the fruit fly by destroying every infested fruit that you can. If there are maggots in cumquats or any other fruits, destroy everyone, as the cleaner the sweep that is made of the first crop of flies the less trouble there will be throughout the season. Where Scale Insects have been introduced on young trees into clean districts, every care should be taken to keep the pest from spreading; and in cases where the young trees are badly affected, it will pay the grower to destroy them at once, as the first loss will be the least. Where leaf-eating insects of any kind are troublesome—such as caterpillars of all kinds, the larvæ of the fig-beetles, or the false ladybirds that attack all kinds of cucurbitous plants, potatoes, &c.—they can be readily destroyed by a spraying of Paris green, 1 oz. to 10 gallons of water, with lime added in as large a quantity as can be got through the nozzle of the pump without choking, as this will tend to make the poison stick on better to the leaves, branches, or fruit.

Farm and Garden Notes for November.

Why do so few farmers grow their own vegetables? This is a question that is frequently asked by visitors to the farming districts. The reason probably is that vegetables require a good deal of care and attention, which mean also a good deal of time taken from the ordinary farm work. In many cases it pays the farmer better to buy many kinds of vegetables than to grow them for himself. The only vegetables grown on many fine farms are cabbages and pumpkins, not to class potatoes under the head. Many people have an idea that European vegetables cannot be grown during the hot summer months, but this is a great fallacy. The Chinese gardeners supply the towns with all kinds of vegetables, except perhaps cauliflowers, during the whole of the summer. It is therefore clear that, by constant work, plenty of manure, water, and some shade for seedlings, most vegetables can be produced during the hot months from November to March.

Field.—Under ordinarily favourable conditions harvesting the wheat and barley crops might have been now begun, but owing to the severe drought it seems ironical to suggest to farmers that the wheat harvest should now begin, seeing that thousands of acres are lying either unseeded or with the ungerminated seed lying rotting in the ground under the influence of the late rains. All that can now be done under these unfortunate circumstances is to get the unoccupied land ready for maize. Those who have oats for hay should cut it when the grain has formed, but before it is ripe, for then the plant is in its most nourishing condition. Destroy caterpillars on tobacco plants, and top the latter so as to throw all the strength into the leaves. Keep down the weeds, which will now now try to make headway; earth up any growing crops requiring the operation; sow maize, imphee, setaria, Kafir corn, teosinte, sorghum, &c. Plant sweet potatoes, yams, earthnuts, and ginger.

Kitchen Garden.—If your ground has been trenched or deeply dug and well worked, the advantages will be seen during the coming months. It does not pay to work shallow dug ground. When sowing and planting this month, give plenty of room between the rows and the plants, otherwise they will be drawn up and worthless, and keep the ground open by constant forking and hoeing. Thin out melon and cucumber plants. It is a good plan to peg down the vines. They will then not be blown about by the wind; they will take root at intervals, and thus help the main stalk. Give plenty of water to tomatoes planted out last month. They should also be mulched. Sow cabbage, French beans, melons, lettuce, radish, pumpkins, cucumbers, marrows, rosellas, &c., and transplant for succession in calm cloudy weather.

Flower Garden.—Stake any dahlias which may now be above ground. Plant out the bulbs which were stored in a moist place. If the weaker bulbs are reserved, they will come in for autumn planting Take up all bulbs that have done flowering, and store in a dry place. Winter flowering plants will have gone off almost, still the garden should be in full bloom, and will repay the trouble bestowed on it, and a little fertiliser given as a top-dressing will assist the plants to bloom and look well for a longer time than if this were neglected. Give weak liquid manure to chrysanthemums, and allow no suckers to grow till the plants have done flowering. Take up narcissus. Do not store them, but plant them at once in new situations. Sow antirrhinum, balsam, zinnia, summer asters, summer chrysanthemums, calliopsis, and nemophila.

REPORT OF THE SECRETARY FOR AGRICULTURE FOR THE YEAR 1902-1903.

TO HIS EXCELLENCY MAJOR-GENERAL SIR HERBERT CHARLES CHERMSIDE, G.C.M.G., C.B., GOVERNOR OF THE STATE OF QUEENSLAND AND ITS DEPENDENCIES, IN THE COMMONWEALTH OF AUSTRALIA.

Brisbane, 1st October, 1903.

SIR,—I have the honour to lay before your Excellency the Report of this Department for the twelve months ending with the 30th June, 1903.

It should be explained that one portion of this Report has already been published—namely, the portion which deals with the administration of the Chief Inspector of Stock. The year reviewed in that officer's statement ends with the 31st of December, and it was decided to make that statement public as soon as the materials for compiling it were collected and arranged. It was impossible, however, to issue at the same time the General Report of the Department, for, as the departmental year begins and ends with the financial year, all the facts necessary for a complete Report were not available before the last day of September.

The following table gives the cost of the Department, not only for the year just closed, but for each of the three preceding years:—

	1899-1900.	1900-1901.	1901-1902.	1902-1903.
Gross expenditure ...	£66,995	£53,330	£46,295	£32,389
Revenue	5,540	6,829	7,321	7,007
Net cost ...	£61,455	£46,501	£38,974	£25,382

THE INSTITUTIONS OF THE DEPARTMENT.

THE AGRICULTURAL COLLEGE.

(*Established July*, 1897.)

	1899-1900.	1900-1901.	1901-1902.	1902-1903.
Gross expenditure ...	£8,599	£7,040	£6,262	£6,029
Revenue	1,823	2,940	2,934	2,281
Net cost ...	£6,776	£4,100	£3,328	£3,748

THE STATE FARMS.

WESTBROOK.

(*Established March*, 1897.)

	1899-1900.	1900-1901.	1901-1902.	1902-1903.
Gross expenditure ...	£1,026	£1,095	£1,055	£841
Revenue	87	121	408	159
Net cost ...	£939	£974	£647	£682

HERMITAGE.

(*Established March*, 1897.)

	1899-1900.	1900-1901.	1901-1902.	1902-1903.
Gross expenditure ..	£2,349	£911	£874	£873
Revenue	106	165	359	149
Net cost ...	£2,243	£746	£515	£724

BIGGENDEN.

(*Established February*, 1898.)

	1899-1900.	1900-1901.	1901-1902.	1902-1903.
Gross expenditure ...	£750	£461	£443	£347
Revenue	43	6	15	30
Net cost ...	£707	£455	£428	£317

GINDIE.

(*Established February*, 1898.)

	1899-1900.	1900-1901.	1901-1902.	1902-1903.
Gross expenditure ...	£2,587	£1,229	£1,818	£496
Revenue	247	94	59	69
Net cost ...	£2,340	£1,135	£1,759	£427

STATE NURSERY, KAMERUNGA.

(*Established January*, 1890.)

	1899-1900.	1900-1901.	1901-1902.	1902-1903.
Gross expenditure ...	£781	£811	£733	£654
Revenue ...	Nil	9	5	28
Net cost ...	£781	£802	£728	£626

TOBACCO FARM.

(*Established July*, 1900.)

		1900-1901.	1901-1902.	1902-1903.
Gross expenditure ...	... ...	£570	£537	£415
Revenue	... ...	Nil	Nil	497

BOTANIC GARDENS AND GOVERNMENT DOMAIN.

	1899-1900.	1900-1901.	1901-1902.	1902-1903.
Gross expenditure ...	£2,692	£2,514	£2,460	£1,967
Revenue	72	72	74	173
Net cost ...	£2,620	£2,442	£2,386	£1,794

EUROPEAN MARKETS.

While federation has afforded our producers a greatly enlarged market, there is reason to believe that in some important lines the requirements of the Commonwealth will be exceeded at no remote date, if the present rate of increase in production is maintained. For example, there seems to be a consensus among those engaged in pineapple-growing that they are within measurable distance of supplying Australian wants in that respect, and they are naturally desirous of ascertaining whether they cannot find in England a market for their products. This matter was inquired into some time ago by the Department, and it was then discovered that the English supply came mainly from the Azores; and our English advisers did not hold out much hope that the Queensland grower would be able to compete successfully with a rival living only seven or eight days' sail from England. Nor was the difference in freights the Queenslander's only disadvantage. It was learned that, without any elaborate precautions, the pineapples of the Azores can be placed on the London market perfect in appearance and flavour. On the other hand, though it is said that a small shipment of Queensland pineapples reached the Mediterranean in good condition, and that another shipment arrived in England thoroughly sound, in general the attempts at carrying this fruit so great a distance have failed. Obviously it does not stand the changes in temperature such a long voyage involves under ordinary circumstances. A uniform temperature is necessary, but it has not yet been established what that temperature should be, and experiments are now being conducted at Gatton College with the view of settling this problem. Among the other questions undergoing investigation are—"What kind of pineapple is best fitted for such lengthened transport?" "At what stage of growth should it be picked?" and "What method of packing it would give the most satisfactory results?" Meanwhile inquiries have been instituted in England concerning the demand for canned pineapple and for pineapple pulp, for both of which commodities a better market than can be found in the Commonwealth is desired.

It is probable that the experiments referred to will be successful, and that if a profitable market for Queensland pineapples does not exist it can be created. But there is another difficulty, the solution of which does not lie wholly with this Department. The matter, moreover, is one which concerns not only our fruitgrowers, but every Queensland producer whose success depends on the speed and regularity with which his wares can reach the English markets. As carriers of agricultural produce, the English mail steamers are invaluable to every Australian State except Queensland. To us they are, in that capacity, of little or no use, and will remain so until Brisbane is included in the ports of call. The Commonwealth Government, it is true, is not responsible for the present arrangements, but with it rests the question whether they are to be renewed or not; and their renewal would violate at least the spirit of the Constitution by giving five of the Australian States commercial advantages over the sixth. For some years the Queensland Government tried to place the Queensland dairy farmer on a footing of equality with his southern rival by subsidising a steamer connecting with the mail boats at Sydney, but the venture was not conspicuously successful, and perhaps under no circumstances could it be made so. We have not, however, given up all hopes of securing weekly or fortnightly visits by the mail steamers, and at least it is some satisfaction to know that the owners of the Aberdeen line of steamers purpose establishing at an early date, between Brisbane and London, a service which will be regular if not so frequent as could be desired.

THE AGRICULTURAL CONFERENCE.

The latest of these Conferences, which are annually increasing in value and importance, was held at Maryborough early in July last. The subjects discussed were practical in character, and much useful information was elicited. Among the papers read was a very interesting one by the Hon. A. J. Thynne, favouring "the addition to the Department of Agriculture of a road inquiry branch, with a capable road officer to advise farmers and shire councils in farming districts." Mr. G. Fox, M.L.A., speaking on behalf of farmers who at present receive no benefits from the Agricultural Bank, asked the Government to adopt the amending Bill he had introduced the previous session. Mr. J. T. Bell, M.L.A., delivered an address on the utility of motor cars for conveying agricultural produce in the country districts, and met with very general support.

Valuable papers were read also by Mr. James Lindsay, on "Light Tramways for Agricultural Districts"; by Mr. C. Dallon, on "Improvement of Breed of Horses"; by Mr. J. McCartney, on "Roadmaking and Drainage"; by Mr. G. Turner, on "Tanning Material as a Profitable Crop"; by Mr. F. W. Peek, on "Agricultural Interests affecting the small Farmer and Producer"; by Mr. J. E. Dean, on "Bulls for Dairying Purposes"; by Mr. H. Sinclair, on "Dairying in Queensland"; by Mr. W. S. Palmer, on "What the Government might reasonably be expected to do in the way of encouraging Pigrearing in certain localities"; and by the Chairman (for Mr. W. R. Robinson), on "Angoras for Queensland." Among the papers not mentioned here were many which well deserve perusal and attention, and they are not particularised because it has been thought advisable to make special reference to such only as were dealt with by the Committee of Resolutions, were made the subject of specific motions by the Conference, and have to be taken into consideration by the Department.

DISEASES IN PLANTS ACT.

The manner in which this Act is carried out by the various inspectors entrusted with its administration is a proof no less of the vigilance than of the tact of those officers. They have often a most invidious duty to perform, and, though they perform it zealously, there is no record of any instance where one of them has exceeded his powers. This is especially true of those whose business it is to prevent plants, fruit, or vegetables which are diseased, or which come from infected countries, from entering this State. On the whole their labours have been successful, considering the magnitude of the work to be done and the smallness of the staff that has to do it. As regards the export trade, such precautions are adopted as can be devised against sending diseased or unsightly fruit to other States and thus injuring the reputation of Queensland. There are exporters, it is true, who do not need to be reminded of their duty in this respect. But there are also exporters who seem to overlook the fact that a single shipment of diseased fruit may shut southern ports against any fruit coming from Queensland. In this connection it should be stated that two of the shipping companies have recently erected cyaniding chambers on their Brisbane wharves, and that these chambers are supervised free of cost by an officer of the Department, though they are competing with the cyaniding chamber maintained and controlled by the Department.

THE CHAMBER OF AGRICULTURE.

The Chamber of Agriculture has completed the second year of its existence, and has, since its foundation, justified its title to a much ampler measure of public support than it receives. Out of about 150 societies only 18 have affiliated with it, though among these 18 are some of the best associations in the State. Geographically it is not unfairly representative of Queensland, for it is in a position to voice the opinions of agricultural organisations in Townsville, Bowen, Bundaberg, Beenleigh, and Roma. That the Chamber is but slowly adding to its membership is due partly to the depressing conditions which have existed during the last two years, but perhaps mainly to the disinclination to union and co-operation among our farmers which has been referred to at some length in a previous report of this Department. It ought to be pointed out to all the societies keeping aloof from it, that its executive includes men who have done, and are still doing, much to advance agriculture, and who are able to speak with authority on one or another of our primary industries. A glance at the Chamber's latest Annual Report will show how wide is the scope of its operations, and how diligently it is inquiring into the problems that beset the agriculturist; but it is clear that its influence for good would be enormously increased if it had the moral and material support of all, or at least the majority, of the Agricultural Societies of Queensland.

THE AGRICULTURAL JOURNAL.

It is satisfactory to know that the publication of *The Queensland Agricultural Journal* continues to be highly appreciated, not only by the agriculturists and pastoralists of Queensland, but also by many of those engaged in rural pursuits in the other States of the Commonwealth and in foreign countries. The Department is in receipt of many letters bearing testimony to the excellence of the articles, both original and selected, which appear in its monthly pages on a variety of subjects connected with rural life. In order to add still more to its value as a medium of information, the editor and artist have visited many parts of the State in the Far North, Central, Western, and Southwestern districts, and also the sugar districts from Nambour to Cairns. All these districts and the industries carried on therein have been faithfully described and illustrated in the pages of the *Journal*, and much useful information has thus been disseminated throughout the State, especially with respect to irrigation. The cost of producing and distributing the *Journal* in 1899-1900 was £2,102; in 1900-1901, £2,360; in 1901-1902, £1,945; and in 1902-1903, £1,363.

MEATWORKS.

Since the issue of the report of the Chief Inspector of Stock for the year 1902, which will be found as an appendix hereto, it is a pleasure to learn that a number of the large meatworks in the Northern and Central districts have recommenced operations.

The works at present in operation are—

NORTHERN DISTRICT.

The Queensland Meat Export and gency Company, Limited	Ross River, Townsville.
The Burdekin River Meat Preserving Company, Limited	Sellheim.
Bergl Australia, Limited	Bowen.

CENTRAL DISTRICT.

The Central Queensland Meat Export and Agency Company, Limited	Lake's Creek.
The Gladstone Meat Works of Queensland, Limited	Gladstone.

SOUTHERN DISTRICT.

The Redbank Meat Company	Redbank.
Baynes Brothers	Queensport.
Uhlmann Brothers	Mooraree.
J. C. Hutton	Zillmere.
Pastoral Butchering Company	Logan road, South Brisbane.
T. and J. Cock	Downfall Creek, Brisbane.

AGRICULTURAL EDUCATION.

Of late the opinion has been expressed that greater efforts should be made to teach at least the rudiments of agriculture to children of school age in the farming districts, and the Department has signified its willingness to do everything that is possible in that direction. In fact, a commencement has already been made. In some places applications from State schools for seeds and manures for experiment plots in the school grounds have been granted, and explanations of the manner of using such seeds and manures have been forwarded to the head master. Visits of teachers and pupils to the State farms in their vicinity have been invited and encouraged; and on one State farm the manager has even established special instruction classes for such visitors. In another instance, at the request of the headmaster, the school has been furnished with a collection of the products of the nearest State farm. Then the editor of the *Agricultural Journal* has written a series of excellent articles on agriculture, much on the model of the standard books on that subject, but applicable in a special manner to Queensland. Probably it would be well to publish this series in book form for distribution in State schools in the rural districts, should it be intended to make agriculture a leading subject in their curriculum. Of course, care will have to be taken to use this book judiciously and not to fall into the error made by the French elementary schools, according to a recent report by the Department of Agriculture in the United States. "It was difficult in the beginning," says that report, "and the difficulty has lasted well up to the present time, to initiate the teachers into the spirit of the new teaching in the primary schools. Books on agriculture were placed in the hands of the pupils; agricultural rules, even though debatable, were taught as axiomatic truths; the memory rather than the understanding was consulted, and the learning of words rather than the observation of facts was made the basis of agricultural teaching." To counteract this tendency, the Minister of Agriculture in France issued circulars directing that the instruction should be addressed less to the memory than to the intelligence of the child; that it should be based on the observations of facts in country life and on simple experiments with familiar objects, and designed to prove the scientific fundamental ideas of the most important agricultural operations; that the children should learn above all things the reasons for the operations rather than the manner of performing them, and that they should not be compelled to learn a list of definitions, precepts, or agricultural recipes.

QUEENSLAND AGRICULTURE GENERALLY.

Irrigation.—From 1895 to 1901 the area under irrigation varied but little, excepting in 1898, when there was an abnormal increase of 3,000 acres, but in 1902 the area rose to 14,344 acres as against an area of 6,526 in the preceding year. The figures for the period referred to are—

	Acres.
1895	6,447
1896	6,395
1897	6,647
1898	9,648
1899	6,311
1900	6,969
1901	6,526
1902	14,344

The districts in which irrigation plants of greater or less degree were installed during 1902 were—

	No. of Irrigators.	Acres Irrigated.	Crops Treated.
Adavale	1	3	Fruit, vegetables
Allora	7	171	General crops
Beaudesert	1	4	Vegetables
Biggenden	1	1	Vegetables
Caboolture	1	1	Lucerne
Camooweal	1	1	Vegetables
Dalby	1	2	General crops
Dugandan	2	13	General crops
Gatton	8	174	General crops
Gayndah	1	1	Fruit
Gin Gin	2	6	Lucerne, vegetables
Harrisville	4	59	General crops
Highfields	1	5	General crops
Killarney	3	29	General crops
Maryborough	8	66	Fruit, vegetables
Nanango	1	2	Fruit
Nerang	6	29	General crops
Redcliffe	1	25	General crops
Rosewood	2	23	Lucerne
Warwick	4	10	Vegetables
Woodford	4	18	General crops
Total	60	663	

In those districts that contained irrigation plants prior to last year the alterations are—

District.	Increase. From— Acres.	Increase. To— Acres.			Decrease. From— Acres.	Decrease. To— Acres.
Aramac	4	17				
Ayr	3,896	4,070				
Banana	1	2				
Barcaldine ...	462	772				
Blackall	...	...	...	...	28	18
Bollon	...	...	...	...	9	8
Bowen	162	201				
Brisbane	7	28				
Bundaberg ...	210	2,906				
Cape River ...	...	...	...	...	39	18
Charleville ...	...	...	...	...	18	17
Charters Towers...	...	...	...	...	47	35
Clermont ...	...	...	...	...	5	4
Cleveland ...	8	16				
Cook	...	...	...	...	15	11
Cunnamulla ...	263	3,200				
Esk	2	45				
Etheridge ...	5	8				
Gympie	...	...	...	...	48	25
Hughenden ...	...	...	...	...	156	54
Hungerford ...	115	136				
Ingham	...	...	...	...	80	70
Ipswich	10	44				
Isisford	...	...	...	...	2	1
Longreach ...	8	35				
Mackay	304	496				
Muttaburra ...	29	31				
Ravenswood ...	4	5				
Rockhampton ...	75	769				
Roma	30	34				
St. George ...	44	46				
South Brisbane ...	...	...	...	...	37	28
Stanthorpe ...	...	...	...	...	36	27
Toowoomba ...	15	168				
Townsville ...	225	273				

The districts of Cloncurry, Herberton, Surat, and Tiaro abandoned irrigation; and Burke, Cairns, Emerald, Norman, Taroom, and Thargomindah remained stationary as compared with 1901. Apart from irrigating sugar-cane, the water is used for all farm, garden, and orchard crops principally in small areas so far, but mention may be made of the operations in the Cunnamulla districts, where wheat, barley, oats, lucerne, artificial and natural grasses on 3,200 acres of land owned or occupied by but three persons are watered from a bore.

During the year a beginning has been made in prospecting for subterranean water in the coastal districts, and there is every reason to believe that the quest will have results beneficial to a large number of small settlers. The money required for the purpose has been provided by the Works Department, and the work of boring is under the direction of the Hydraulic Engineer.

Sugar.—This crop, like all others, suffered to a very great degree from the drought, as will at once be seen when the figures for this year are compared with those for the four preceding seasons, viz.:—

	Acres Crushed.	Average Yield of Sugar per Acre Crushed.		Acres Crushed.	Average Yield of Sugar per Acre Crushed.
1898	82,391	1·99 tons	1901	78,160	1·55 tons
1899	79,435	1·55 „	1902	59,102	1·30 „
1900	72,651	1·28 „			

The total quantity of cane crushed was 641,927 tons as compared with 1,542,090 tons in 1898, 1,176,466 tons in 1899, 848,328 tons in 1900, and 1,180,091 tons in 1901. Some of this shrinkage is accounted for by the fact that owing to the shortage in other fodder in the State during 1902 about 15,000 acres of sugar-cane were used to supply the deficiency, whereas in 1901 only about 600 acres were so used. Thus, taking the average yield per acre at 10 tons, it will be seen that after deducting the average acreage usually consumed as fodder, the mills received about 140,000 tons of cane less than would otherwise have been available for crushing. In comparing the crop with that of the four preceding years, it will be observed that the actual tonnage for the past year would have very nearly reached that of 1900, which, however, was considerably the lowest during that period. The density of the juice in 1902, however, was the best obtained during the last five years, it only taking 8·38 tons of cane to make a ton of sugar, as compared with 9·42 tons in 1898, 9·54 in 1899, 9·44 in 1900, and 9·76 tons in 1901. If, therefore, the 140,000 odd tons used as fodder had been crushed and the average density maintained, the sugar produced would have slightly exceeded the production for 1900.

Of the 66 mills of various sizes in the State only 44 crushed last season, and in the case of those in the Central, Wide Bay, and Southern districts the crushing was very small. The Northern mills, especially those in the Cairns and Port Douglas districts, had excellent crushings, which yielded almost all the sugar manufactured in the State. This, to a certain extent, was anticipated in the last Report, but owing to the continuance of the drought, extending as it did in the Southern and Central districts well into this year, the output from these districts was considerably less than had been expected, and thus reduced the general result to 76,626 tons.

The following table shows clearly to what extent the farmers endeavoured throughout the State to grow and harvest cane by white labour, and thus obtain the federal rebate :—

Rebate.	Petty Sessions District.	Area Crushed for Sugar.	Weight of Cane Harvested.
		Acres.	Tons.
No. 1 at 5s. ...	Cairns and Douglas	501	6,643
	Ingham and Mourilyan	516	8,684
	Total	1,017	15,327
No. 2 at 4s. 8d. ...	Bowen	750	10,239
	Mackay	6,320	55,395
	Total	7,070	65,634
No. 3 at 4s. 4d. ...	Bundaberg and Gin Gin	2,077	8,661
	Childers, Maryborough, and Tiaro	736	4,531
	Total	2,813	13,192
No. 4 at 4s. ...	Logan	213	2,264
	Maroochy and Gympie	262	2,194
	Nerang	1	21
	Total	476	4,479
	Grand Total	11,376	98,632

The Mackay district, it may be of interest to note, produced more than half the cane thus grown. The actual rebate paid on returns obtained by the Customs Department, however, gives the total tonnage as 105,303 tons, or a little over 16 per cent. of the total cane crushed during the year. The total rebate paid was £24,509 8s. 11d.

Another interesting fact is that the greatest quantity of cane per acre was obtained in the Ayr district, where some 4,070 acres were irrigated out of a total of 4,344 acres cultivated for sugar during the year. This is the second succeeding year that this district, in producing the greatest tonnage per acre, has furnished indisputable evidence of the benefits to be derived from irrigation.

The prospects for this season (1903) are exceedingly bright, and it is expected that the general result will almost equal that of 1901. Indeed, given a continuance of the existing very favourable weather conditions, it may confidently be expected that the 1904 season will equal the output of 1898, the most prolific of former years

When the current season's results are available they will, it is thought, furnish a striking example of the recuperative capacity of this State, and should be an encouragement of inestimable value to those engaged in the industry.

Dairying.—The export trade in 1902 was seriously affected by the almost entire absence of natural fodder throughout the greater part of the year, and by the high price of artificial feed. In 1901 the export of butter was larger than in any previous year, but during 1902 the volume of trade exceeded the relatively small output of 1897 by about one-third only. The statistics of the Board of Agriculture show that during 1902 about 198,747 tons of butter were imported into Great Britain, of which New South Wales is credited with 881½ tons, Victoria with about 3,126 tons, South Australia with about 12 tons, and Queensland with 1 ton. Of the 244½ tons of butter, the produce of this State, exported during last year, about 157 tons went to New South Wales, Victoria, South Australia, and West Australia—the greater part to the two first-named. Of the remainder, 84¾ tons went to South Africa and the Mauritius, and the balance to Eastern ports. The total export figures for the past five years are—

	Tons.	Valued at.
1898	433 ...	£37,286
1899	517 ...	49,429
1900	620 ...	51,662
1901	931¾ ...	86,150
1902	246½ ...	24,610

The quantity of milk dealt with for the manufacture of butter and cheese was 13,787,175 gallons as against 26,286,459 gallons in 1901, or, roughly speaking, a reduction of 50 per cent. The output of butter for the year, in comparison with 1901, shows a falling off in about the same proportion, the figures for the two years being 4,851,362 lb. and 9,741,882 lb. respectively. The cheese made fell from 2,436,912 lb. in 1901 to 952,013 lb. in 1902. The prospects for the dairying industry since the commencement of the present year have, so far as the supply of grass and water is concerned, been most hopeful, and it is expected before twelve months have passed that the export will have exceeded that of the record year 1901. The importance of the industry is shown by the fact that the value of the machinery and plant employed in butter and cheese factories in the driest year the industry has known was estimated at £51,809, and the value of the land and premises in which the machinery was used at £48,223. The manufacture of condensed milk is now carried on in these factories, and it is hoped that in due time the produce of the State in this direction will meet local demands, and obviate the necessity for importing this particular form of milk. That there is room for increased production is shown by the value of the imports, which in 1902 amounted to £44,478. Trustworthy statistics concerning cattle kept for dairying purposes are not yet available; but there are grounds for believing that the losses among such cattle are proportionately not so great as among stock generally; and of the dairy cattle that have succumbed to the drought it is thought that a large portion consisted of those which were least valuable. It is known also that in many cases the losses are being replaced by animals of a superior milking strain.

The production of bacon and hams diminished proportionately to the fall in the supply of milk, which is now essential in pig-farming. The loss in pigs in 1902 was 36·53 per cent., the decrease in the number of animals being from 121,641 in 1901 to 77,202 in 1902. In 1893 we had 68,066 pigs, and in 1894 89,677, so that at the present time our stock is, numerically, about the same as it was ten years ago. The number of pigs slaughtered in 1902 was 88,416, from which 329,564 lb. of fresh pork, 512,109 lb. of salt pork, and 6,512,952 lb. of bacon and hams were obtained. There were five factories for bacon and ham curing in operation during 1902, having a value in machinery, plant, and premises of £62,396. If this amount be added to the capital employed in the butter and cheese factories mentioned, it will be seen that no less a sum than £162,000 is embarked in this industry.

Wheat.—The statistics for some of the principal wheat-growing centres for 1902 sufficiently indicate the disastrous effect of the season upon this branch of farming.

The total area that returned a crop of grain in 1901 was 87,232 acres, but in 1902 a harvest was reaped from 1,880 acres only for a yield of 6,165 bushels, an average of 3·28 bushels to the acre, as against a return of 1,692,222 bushels on the former year, with an average of 19·40 bushels to the acre. In the last Report of the Department the Allora district was credited with 22,131 acres for grain in 1901, the Toowoomba district with 18,609 acres, and the Warwick district with 14,762 acres. In 1902 the Allora district was successful in reaping 1 acre only for a return of 24 bushels, and Toowoomba 2 acres for 40 bushels. The Warwick district, however, was more fortunate, for there the farmers were able to harvest 923 acres for a return of 3,433 bushels at the rate of 3·72 bushels to the acre.

The State being thus practically destitute of seed for next season's sowing, it was decided that the Department should take the matter in hand, and that the best seed available should be procured from South Australia and sold at cost price to the farmers, with 5 per cent. added where terms were given. As a preliminary step, the Agricultural Adviser visited all the wheat-growing districts, called meetings of the farmers, and, from the information gathered, formed conclusions upon which the decision as to the quantity and varieties to be purchased was based. That his estimate was well founded is shown by the fact that the quantity remaining on hand when the distribution ceased amounted to 1,400 bags only; and it can be said that this surplus would not have existed had not private traders introduced and sold seed wheat after the Department had made its purchase.

That the farmers might be satisfied that the best efforts would be made on their behalf to obtain seed of prime quality, Mr. W. D. Lamb, of Yangan, was asked to accompany the Agricultural Adviser, Mr. Peter McLean, to South Australia, in order to make a suitable selection. That this selection was suitable is proved, not only by the comments of individual farmers, but also by the following resolution passed at the recent Agricultural Conference at Maryborough:—"A vote of thanks be accorded to the Department of Agriculture for the supply of seed wheat, &c., to the farmers, and also for the care and energy its officers have displayed in its choice and distribution." The Department also made arrangements by which nearly the whole of the locally-grown wheat held by millers was made available for planting.

The locally-grown seed was distributed from Warwick and Toowoomba. The South Australian wheat was all distributed from Toowoomba, from the malting-house of Messrs. Redwood and Co., a place most convenient in every way for such a purpose, and well equipped with all the appliances for the work. An agreement was made under which Messrs. Redwood and Co. undertook to receive, screen, and despatch the seed at the fixed price of 4d. per bushel, the payment to include all charges, including insurance. Arrangements were made with the Railway Department by which the freight on the seed was much more favourable to the farmers than if they had purchased it in the ordinary way of business and in a normal season. The quantity of wheat that has passed through the hands of the Department for distribution was 63,926$\frac{4}{60}$

bushels, and the amount of work devolving upon those connected with the distribution was very great.

The applications for seed numbered 1,636
The total number of bushels distributed was ... $51{,}869\frac{43}{60}$
The average number of bushels to each farmer was 31·70

It may be of interest to include here a table giving the area under crop for grain in 1901, and the quantity of seed distributed by the Department:—

Petty Sessions District.	Acres Reaped for Grain in 1901.	Bushels of Seed Grain distributed by the Department in 1903.
Allora ...	22,131	8,757
Brisbane	Nil	4
Banana	4	
Beaudesert	1	
Biggenden	22	
Caboolture	1	
Clermont	35	
Condamine	142	26
Crow's Nest	642	314
Dalby ...	7,518	4,895
Dugandan	13	15
Emerald	75	
Gatton	116	25
Gayndah	9	
Gin Gin	10	
Gympie	2	
Harrisville	9	4
Highfields	3,378	976
Inglewood	512	223
Killarney	4,430	3,427
Laidley	1	62
Mitchell	2,318	1,957
Nanango	699	685
Nerang	2	
Rockhampton	2	68
Roma ...	8,798	7,483
St. George	9	23
Springsure	4	44
Stanthorpe	48	
Surat ...	25	
Townsville	2	
Texas ...	217	95
Tiaro ...	1	
Toowoomba	18,609	14,612
Warwick	14,762	7,778
Yeulba	2,685	396
Total ...	87,232	51,869

The names and quantities of the different varieties of seed purchased in South Australia are as follow:—

Variety	Bags.	Variety	Bags.
Marshall's No. 3 ...	3,033	Warwick ...	1
Allora Spring	276	Leatherhead	151
Gluyas	378	Carmichael	106
Smart's Early	620	Australian Wonder	50
Dart's Imperial	4,524	Hamblyn's Prolific	94
Newman's ...	1,054	Silver King	44
Early Para	140	Marshall's No. 1 ...	24
Bluey	310	Fill Bag ...	59
Petatz	334	Baroota Wonder ..	8
Budd's Early	319	Steinwedel	300
White Tuscan	150		

Excepting Allora Spring, which was taken to South Australia from Queensland, and the White Tuscan, which is a universal wheat, all the varieties may be classed as South Australian, and were selected for their milling and marketable qualities and their suitability to the Queensland climate.

The financial side of this distribution may be summarised as follows:—

	£	s.	d.
Total first cost of wheat for distribution, in which is included milling wheat purchased to exchange for Queensland wheat	18,543	2	5
Amount paid to shipping and commission agents and other persons in connection with the purchase of seed	527	3	3
Amount paid for freight and other charges by sea and rail	2,448	0	3
Amount paid for receiving and distributing	1,256	8	11
Amount charged to farmers per bushel	0	7	6

The discrepancy between the total quantity handled for distribution and the quantity distributed is thus accounted for—

1. Seconds, the result of screening and not considered good enough for seed and sold at auction.
2. Refuse or chick wheat sold at auction.
3. Surplus milling wheat from distribution sold by tender after being offered to all the milling companies.

The action of the Department has made it possible, with a favourable season, for the farmers to recoup themselves for their losses last year, and it is anticipated, if conditions remain as at present, that the harvest for 1903 will far exceed that of 1901, in which, during the history of the State, the greatest number of acres of wheat were reaped for grain. It is thought, from the information gathered by the Agricultural Adviser, that at least 110,000 acres have been sown—possibly more—and it is estimated that the harvest we are now looking forward to will amount to nearly 2,000,000 bushels, which, if the estimate be a true one, will show a fair advance towards the supply within our borders of our own requirements. The proportion in 1901 was 48 per cent. of the consumption.

A feature that is worth remarking is the increased area that will be found for this year in the Nanango district, which is favourably situated as to climate and soil for the production of wheat grain. The farmers that have lately settled there have favoured this crop, and with the completion of the railway it is not beyond the bounds of a fair prophesy to say that before long this district will be a rival to the more well-known wheatgrowing regions.

Malting Barley.—The evident demand for seed of this cereal, and the scarcity of Queensland seed for sowing during the last planting, necessitated action being taken to replace the shortage, and arrangements to that end were made upon similar lines as regards distribution to those made for the seed wheat, but the purchase of the seed was planned in a different way. The produce from the crop of 6,818 acres in 1901 was 193,538 bushels, but in 1902 a crop of but 1,749 bushels was raised from 163 acres only. Seed was, therefore, needed as in the case of the wheatgrower, and to obtain it advantage was taken of an intended visit by Mr. Redwood to the Southern States and New Zealand, in connection with his business as a maltster, to purchase seed suitable to Queensland on behalf of the Department. Authority was given for the purchase of seed up to about 12,000 bushels, and the agreement was made with Mr. Redwood to the effect that if the applications for seed fell short of the quantity purchased he would take the balance from the Department at actual cost price. The seed was bought in New Zealand. The distribution was made from the malting-house at Toowoomba, the greater part being sent to farmers in the district bounded by Toowoomba, Warwick, and Allora. Brought to figures, the transaction may be summarised as follows:—

1. The number of farmers supplied was 485
2. The total number of bushels distributed was ... ... 9,365 bus. 2 lb.
3. The average number of bushels to each farmer was ... 19·31 bus.

	£ s. d.
4. Total first cost of barley for distribution	2,249 13 2
5. Amount paid to shipping and commission agents and other persons in connection with the purchase of the seed	75 15 9
6. Amount paid for freight and other charges by sea and rail	696 14 7
7. Amount paid for receiving and distributing	244 17 11
8. Amount paid for Customs duty	467 11 7
Amount charged to farmers per bushel	0 6 6

9. The total quantity handled by the Department was 12,436 bushels, of which 1,032 bushels were classed as seconds and unfit for seed, and the balance, after deducting the 9,365 bushels distributed to farmers, was purchased by Mr. Redwood at cost price.

The districts in which the seed has been distributed are—

Petty Sessions Districts.	Bushels of Seed Barley Distributed.
Allora ...	2,171
Brisbane	4
Crow's Nest	135
Dalby ...	234
Dugandan	20
Highfields	173
Killarney	440
Laidley ...	48
Nanango	49
Roma ...	40
Toowoomba	4,503
Warwick	1,532
Yeulba ...	16
Total ...	9,365 bushels.

The season at present promises well for this crop, and it is estimated that at least 10,000 acres have been sown for grain, and, should hopes in this direction be realised, a yield of 350,000 bushels may be expected at the average of 35 bushels to the acre. The following table shows the steady growth the Queensland malting barley has made in the favour of the maltsters :—

MALT MADE IN QUEENSLAND.

—	From Imported Barley.	From Queensland Barley.	Total Malt Made.
	Bushels.	Bushels.	Bushels.
1898 ...	12,278	20,351	32,629
1899 ...	42,851	19,420	62,271
1900 ...	15,337	57,393	72,730
1901 ...	1,000	69,000	70,000
1902 ...	9,500	75,500	85,000

In addition to the malt made in this State, 117,134 bushels of malt were imported for use in Queensland.

In addition to the wheat and barley procured for the farmers of the Darling Downs and the Maranoa, the Department was able to distribute about 4,000 bushels of Algerian and Tartar oats, chiefly in the Wide Bay and Burnett district.

A considerable quantity of cotton seed has also been supplied to localities where there seems to be a fair prospect of its being successfully cultivated.

Tobacco.—The experiment made in Texas to encourage the cultivation of tobacco has been so successful that an agreement upon favourable terms has been made with the Scottish Australian Investment Company for a further tenure of the farm upon which the operations have been carried out, and the engagement of Mr. Nevill, who has done so much to encourage the industry, has been renewed. The main objects in view are to prove that the cultivation of tobacco can be prosecuted at a profit, to teach the best methods of cultivating the crop, and of handling it in its different stages until it is ready to be placed on the market in a condition equal to that of the best imported leaf.

The possibility of a successful growth of the tobacco plant has never been in dispute, and the cultivation of it has not passed the ability of the farmer who understands his work; but the failure in the past, so far as the open market is concerned, has been in the production of an article that has been properly cured, a difficulty which has been experienced in other States of the Commonwealth, and it is to this point that the principal efforts of the Tobacco Expert have been directed in the operations at Texas. The success of his work is proved by the fact that, notwithstanding the almost total absence of rain, he was able to raise and place on the market 2 tons of tobacco, which, when offered at public auction, brought 11d. per lb., the highest price that has been obtained for Queensland-grown tobacco at a public competition. Since the establishment of the Commonwealth, the supply of tobacco grown in Australia has not exceeded the demand, and, providing that the material offered is of good quality, there will be a sufficient market for some years to come. It is estimated upon present prospects that the area to be sown during the coming planting time will exceed the area planted in 1902—viz., 722 acres—by 200 acres at least; and, if the average value of a crop to the farmer be taken at 6d. per lb., the returns from the harvest to be reaped about March next should, if the season is favourable, be not less than £25,816. In 1902 the area under this crop showed a decline of 46 acres, which is smaller decline relatively than that of other principal crops. In the Texas district there was an increase of 23 acres.

Fruit.—The total value of fruit bottled or tinned, dried or green, or pulped, imported last year was £136,076, and the export of similar items of Queensland produce and manufacture was £124,760—a difference against the State of £11,216. The imports of green fruit were valued at £73,875 and the exports at £119,954, and if these figures be taken from the totals before given it will be found that the imports were greater than the exports by £57,395. The exports of Queensland-made jams, jellies, and preserves of that kind in 1902 were of the value of £4,694; but the imports were worth £45,167—a difference in favour of the imports of £40,473. The figures taken for the last two years of the three principal fruit crops are—

	1901.	1902.	Decrease.
Bananas—Bunches	2,313,719	1,160,015	1,153,704
Pineapples—Dozen	359,717	260,444	99,273
Oranges—Dozen	1,880,264	1,191,242	689,022

The area under bananas decreased by 587 acres, for the greater part in the Cairns, Cleveland, and Logan districts. This was to some extent counterbalanced by an increase in area of 42 acres in the Brisbane district, 35 acres in Maroochy, and 37 acres in Redcliffe. Plantings of pineapples, on the other hand, exceeded the area under that crop in 1901 by 81 acres, the Brisbane district contributing 32 acres, the Logan 21, Maroochy 20, Maryborough 10, Caboolture 6, Cairns 9, and Cleveland 8. The districts amongst others which returned reduced areas were Cook, Mourilyan, Redcliffe, Rockhampton, and South Brisbane.

The area under oranges increased from 3,083 acres in 1901 to 3,141 acres in 1902, an addition of 58 acres. Of the area under crop last year 1,056 acres were not in bearing. The largest increases in area were—Maroochy 84 acres, Cairns 25 acres, Maryborough 19 acres, Nerang 15 acres, and South Brisbane 13 acres. The largest decrease consisted of 14 acres in the Logan district.

As might be expected, the crop of mangoes was reduced considerably, the falling off amounting to 79,789 dozen, but 37 acres of land were planted in addition to the 383 acres that were under crop in 1901. The area under apples increased from 278 acres to 353 acres, and the produce from 7,495 bushels to 9,165 bushels, an increase of 1,670 bushels. Of the essentially tropical fruits the increased yield of cocoanuts may be mentioned. Though the area estimated to be under cocoanut trees in 1901—667 acres—was not added to, the production increased from 8,757 dozen to 12,900 dozen. The cocoanuts are growing for the greater part upon the islands off the coast, principally from Mackay northwards. Many of these trees were planted by this Department during the operations carried on some years ago for that purpose.

Vegetables.—A return of some of the principal vegetables grown here will show what has been done during the last two years, and the effect of the drought upon this kind of produce:—

	Acres—1901.		Acres—1902.	
Cabbages ...	672	269,630 doz.	286	100,920 doz.
Tomatoes ...	260	25,622 bush.	234	22,649 bush.
Cucumbers ...	198	100,887 doz.	183	44,485 doz.
Yams	81	61 tons.	88	74 tons.
Beans	56	5,458 bush.	58	4,872 bush.
Turnips ...	331	2,645 tons.	34	85 tons.
Peas	82	5,276 bush.	26	1,215 bush.
Onions ...	179	9,148 cwt.	22	1,036 cwt.

The imports of vegetables for 1902 were—

Vegetables, green, value ...	£6,782
" preserved ...	5,970
" dried or concentrated ...	3,506
" preserved in liquid ...	285
	£16,543

Maize.—This was probably one of the first crops planted in the Moreton Bay Settlement, and it has continued to be one of the principal crops cultivated, but of late years the area devoted to this grain has varied considerably, and the average produce per acre has risen and fallen. Setting aside the area used for green feed, the statistics for the last five years have been—

	Acres under Crop.	Yield.	Average per Acre. Bushels.
1898	102,835	2,252,481	21·90
1899	110,489	1,965,598	17·79
1900	127,974	2,456,647	19·20
1901	116,983	2,569,118	21·96
1902	89,923	1,033,329	11·49

The imports for 1902 were of the value of £219,168, distributed as follows:—

Argentine ...	£133,656
New South Wales ...	42,350
Victoria ...	35,786
United States of America ...	3,684
New Zealand ...	3,680
British New Guinea ...	12

The failure of the crop last year is, of course, accountable for the heavy imports, but, apart from that cause, the fact remains that, notwithstanding the advantages we possess for the growth of this grain, the State does not produce sufficient for its own wants. The imports for the last four years have been—

	Bushels.	Value.
1899 ...	501,179	£89,256
1900 ...	247,449	42,388
1901 ...	131,601	23,307
1902 ...	1,133,371	219,168

Taking the net average of the quantity of maize imported during 1900 and 1901 (the exports were 16,972 bushels and 2,464 bushels respectively) as an example of the difference between our supply and the demand, it will be seen that at 20 bushels to the acre, which is about our average, there is yet room for the cultivation of about 9,000 acres with this grain in excess of the present area.

Of the districts that in 1902 had more than 1,000 acres under maize, four only increased the area as compared with 1901. The Herberton district advanced its area from 3,875 acres to 4,040 acres, an increase of 165 acres; Nerang, from 2,217 acres to 2,281 acres, an addition of 64 acres; and Nanango from 1,994 acres to 3,448 acres, an increase of 1,454 acres.

An increase of the area cut for green feed in 1902 was to be expected, the advance being from 10,501 acres in 1901 to 21,824 acres.

The proportions of the area under maize in the different divisions of the State to the whole area under this crop for grain were—

	Per cent.
Southern	88·85
Central	0·48
Northern	10·67

The efforts of Professor Shelton, when Instructor in Agriculture, to induce farmers to save cornstalks for use as a fodder in times of scarcity did not secure much interest when he brought the matter forward, but the scarcity and the high price of fodder last year have shown people that his teaching was sound. It is not too much to say that had the corn stover been saved instead of being burned, as is the general custom, the lives of many dairy cattle would have been saved and the expenditure for bulk food would have been materially diminished.

Broom Millet.—Queensland is well adapted for the cultivation of this crop, which supplies the raw material for a greater part of the brushware we use; but, instead of utilising this opportunity of adding to the income of the farm, we are content to buy from outside the State about 75 per cent. of the raw material. Of the total raw material used in Queensland in 1901, this State produced but 25 per cent. and in 1902 but 20 per cent.; the area under crop in the two years being 81 acres and 42 acres respectively, the yield being 50,746 lb. and 16,742 lb. The imports of raw material in 1902 were valued at £1,602, but in addition we require the manufactured article and found it necessary to bring in brushware to the value of £12,909. The statistics do not differentiate between the kinds of brushware, and no doubt a considerable portion of the value quoted included brushware made with hair; but, taking the imports from the other Australian States as representing the broom millet portion of the total imports of brushware, the value will be found to be £3,040. The margin for an addition to this crop before the supply equals the demand is not great, but instead of importing at all we should be exporting. The cultivation of this crop is practically confined to the districts of Laidley, Gatton, Dugandan, and the Logan, the firstnamed having the largest area under crop in 1902—viz., 15 acres. This plant has a value beyond that for broom-making, in so far that the seed is good for poultry; but buyers prefer to purchase with the seed on, because, unless care is exercised in stripping the seed, the marketable value of the millet is likely to be diminished.

Coffee.—The production of coffee in Queensland is only 45 per cent. of the consumption within the State, but notwithstanding this fact the area planted does not increase at the rate it should do.

From February, 1895, to 1901 the plantations steadily increased in size, the figures being—

	Acres.		Acres.
1895	60	1899	495
1896	138	1900	537
1897	311	1901	547
1898	432	1902	396

The decrease in 1902 may be set down to the extraordinary season all crops have recently had to encounter, and it is hoped that the better conditions now prevailing will result in an area being cultivated considerably in excess of that of 1901. There was no encouragement in the former year to plant fresh areas.

The divisions of the State contributed to the coffee crop in the following areas:—

	Bearing. Acres.	Not Bearing. Acres.
Southern	54	9
Central	3	16
North	257	57

In 1901 the Herberton district obtained the highest yield—2,200 lb. of parchment coffee from 1 acre.

The average yield per acre and the total yield from the productive area since 1896 are—

	Average lb.	Total lb.		Average lb.	Total lb.
1896 ...	373 ...	9,707	1900 ...	361 ...	102,134
1897 ...	453 ...	81,614	1901 ...	352 ...	130,293
1898 ...	284 ...	56,552	1902 ...	361 ...	113,301
1899 ...	470 ...	104,981			

The records for 1895 are not given as in the table showing the area under coffee-trees, because the returns for that year did not discriminate between bearing and non-bearing trees.

The production for 1901 and for 1902 amounted to 130,293 lb. and 113,301 lb., respectively, a decrease for the latter year of 16,992 lb.

The imports of raw and roasted coffee for the past five years have been—

	Lb.	Valued at—		Lb.	Valued at—
1898 ...	178,681 ...	£7,302	1901 ...	167,908 ...	£6,153
1899 ...	217,602 ...	8,259	1902 ...	164,044 ...	5,884
1900 ...	153,647 ...	6,323			

Viticulture.—During the five years ending in 1902 the vignerons have experienced two seasons that have injuriously affected the crops to a considerable extent in one district or another. Last year conditions were so unfavourable that the quantity of grapes gathered fell from 4,063,109 lb. to 2,284,404 lb. The five principal districts in the State in which the cultivation of the grape vine is followed are Roma, Brisbane, Toowoomba, South Brisbane, and Warwick, and the average per acre for Queensland for the past five years has been—

	Lb.		Lb.
1898	2,383	1901	2,403
1899	1,850	1902	1,755
1900	2,096		

The total area under vines, which in 1901 was 1,990 acres, in 1902 fell to 1,559—a decrease of 431; of this diminished quantity 362 acres belonged to the Roma district, and are wholly accounted for by the drought. Vignerons there are not dismayed by their losses, however, and are now engaged in replenishing their vineyards. The demand this year for cuttings from the vineyards of the Department has been so large that it has been impossible to supply applications in their entirety, and it has been found necessary to rescind, for a limited period, the prohibition of the importation of grape vine cuttings from South Australia, and to permit vignerons to obtain cuttings from that State under conditions which preclude the introduction of vine diseases.

The district obtaining the highest yield in 1902 was Warwick with 3,431 lb. to the acre, followed by Toowoomba with 2,601 lb., and Brisbane with 2,536 lb. In 1901, Toowoomba was the most successful with 4,213 lb.; then came Warwick with 3,821 lb., and Brisbane with 3,002 lb. The quantities of wine made and of brandy distilled during the past five years have been—

	Wine Made. Gallons.	Brandy Distilled. Gallons.		Wine Made. Gallons.	Brandy Distilled. Gallons.
1898 ...	134,334 ...	1,115	1901 ...	148,835 ...	1,112
1899 ...	131,045 ...	615	1902 ...	100,852 ...	2,199
1900 ...	132,489 ...	1,055			

Excluding 1902, it will be noticed that the production has not varied much; but that there is considerable scope for increase in it is shown by the imports, which for 1902 were valued at £30,787. To this total New South Wales wine contributed £5,384, Victorian wine £9,860, and South Australian wine £6,671. The corresponding amounts for the preceding year were—New South Wales, £2,989; Victoria, £2,248; and South Australia, £5,277.

TABLE A.

STATEMENT showing the PERCENTAGE OF DECREASE of the PRINCIPAL CROPS during 1902 as compared with 1901.

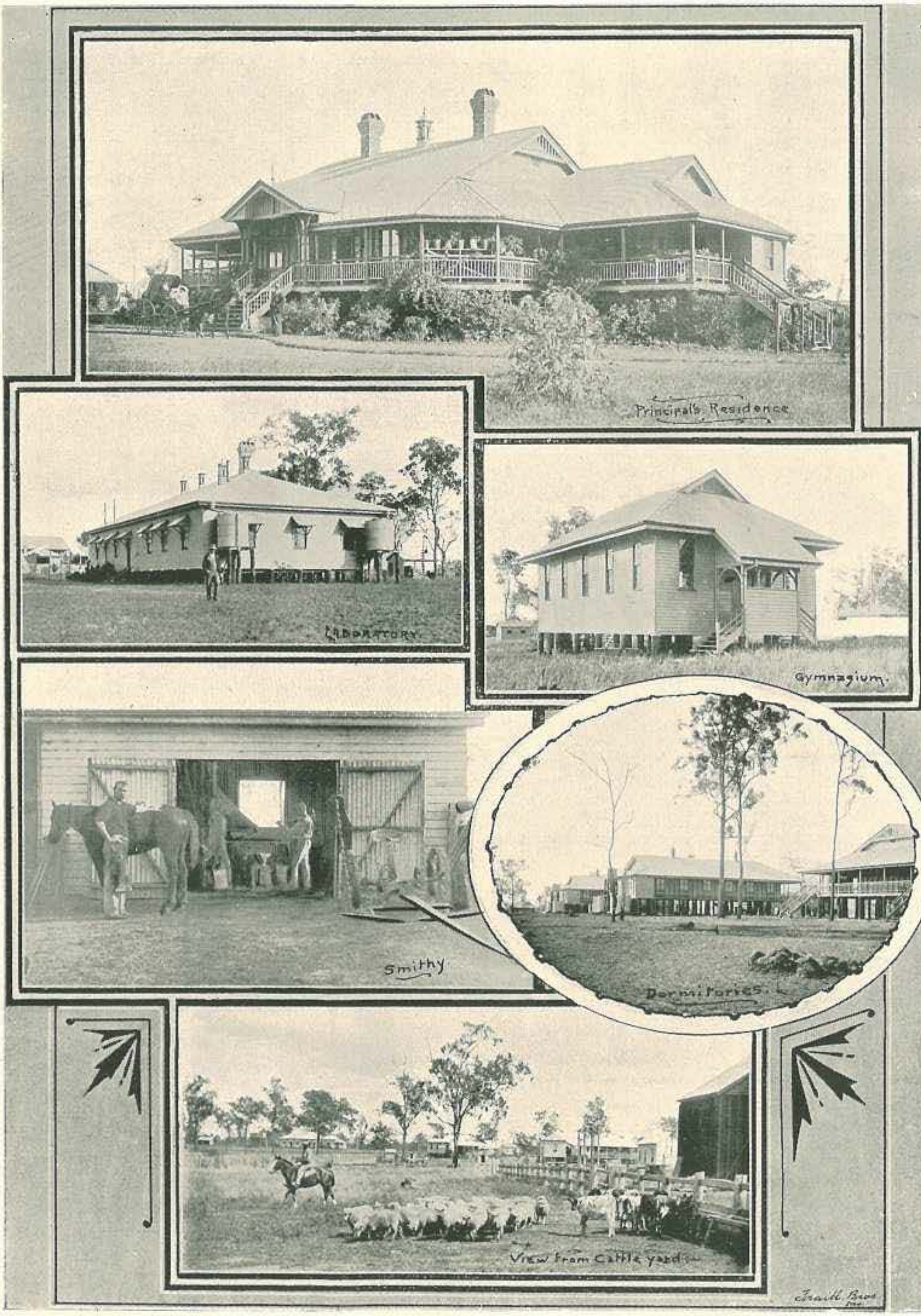
Produce.	1901.	1902.	Decrease per cent.
Grain—			
Wheat	1,692,222 bush.	6,165 bush.	99·63
Oats	42,208 „	520 „	98·76
Barley—			
Malting	193,538 „	1,749 „	99·09
Other	83,499 „	1,846 „	97·66
Maize	2,569,118 „	1,033,329 „	59·77
Rye	5,000 „	238 „	95·24
Rice	5,222 „	1,093 „	79·06
Potatoes—			
English	22,402 tons	3,257 tons	85·46
Sweet	17,128 „	7,165 „	58·16
Sugar-cane	1,180,091 „	641,927 „	45·60
Arrowroot (commercial) ...	4,069 „	1,641 „	59·67
Tobacco (cured leaf)	5,848 cwt.	1,818 cwt.	68·91
Coffee	130,293 lb.	113,301 lb.	13·04
Pumpkins and Melons ...	56,297 tons	6,087 tons	89·18
Hay, Wheat	15,096 „	1,049 „	93·05
Oats	36,321 „	3,915 „	89·22
Barley	600 „	60 „	90·00
Rye	972 „	208 „	78·49
Lucerne	66,888 „	16,146 „	75·86
Panicum	2,102 „	1,714 „	18·45
Vines—			
Wine made	148,835 gals.	100,852 gals.	32·23
Grapes gathered ...	4,063,109 lb.	2,284,404 lb.	43·77
Bananas	2,313,719 bunches	1,160,015 bunches	49·86
Pineapples	359,717 doz.	260,444 doz.	27·59
Oranges	1,880,264 „	1,191,242 „	36·64

TABLE B.

STATEMENT showing the VALUE of AGRICULTURAL EXPORTS, the PRODUCE and MANUFACTURE of this STATE during the Years 1900, 1901, and 1902.

Exports.	Value.		
	1900.	1901.	1902.
	£	£	£
Sugar, molasses, and syrups	678,681	792,329	948,951
Grain	437	3,013	26,890
Hay and chaff	1,500	2,646	1,270
Dairy and auxiliary industries ...	101,269	129,724	67,921
Fruit	104,747	102,630	124,760
Produce of root crops	3,674	4,857	4,681
Vegetables	4,013	5,875	3,338
Other	9,840	13,878	49,670
Total	£904,161	£1,054,952	£1,227,481

Plate XXII.



PRINCIPAL'S RESIDENCE AND COLLEGE BUILDINGS.

TABLE C.

TABLE showing the RELATIVE VALUES of EXPORTS, the PRODUCE of the STATE during the Years 1900, 1901, and 1902.

—	1900.		1901.		1902.	
	Value.	Percentage of Total.	Value.	Percentage of Total.	Value.	Percentage of Total.
	£		£		£	
Agricultural...	904,171	9·67	1,054,952	11·71	1,227,481	14·06
Pastoral ...	5,248,785	56·11	4,750,353	52·72	3,934,171	45·05
Mineral ...	2,894,689	31·91	2,933,147	32·56	3,164,332	36·24
Other ...	217,044	2·31	271,244	3·01	406,071	4·65
Total ...	£9,534,689	100·00	£9,009,696	100·00	£8,732,058	100·00

Appended are Reports from—

The Principal of the Queensland Agricultural College.
Manager of the State Farm, Westbrook.
Manager of the State Farm, Hermitage.
Manager of the State Farm, Biggenden.
Manager of the State Farm, Gindie.
Manager of the State Nursery, Kamerunga.
The Inspector and Valuator under the Sugar Works Guarantee Acts.
The Instructor in Fruit Culture.
The Instructor in Coffee Culture.
The Tobacco Expert.
The Viticulturist.
The Colonial Botanist.
The Entomologist and Vegetable Pathologist.
Director of the Botanic Gardens and Government Domain.
Trustees of the Queensland Museum.
The Chemistry Division.
Secretary Meat and Dairy Board.
The Chief Inspector of Stock.

The Report required by "*The Sugar Experiment Stations Act of* 1900" is in course of preparation, and will be tabled in both Houses at an early date.

I have, &c.,

D. DENHAM,

Secretary for Agriculture.

REPORT OF THE PRINCIPAL OF THE QUEENSLAND AGRICULTURAL COLLEGE.

SIR,—I have the honour to submit the following Report on the work carried out at this institution during the year ending 30th June, 1903, together with extracts from reports submitted to me by the officers who preside over the different departments:—

I am pleased to say that no change has taken place in the teaching staff, with the exception that Mr. Quinn, of the Department of Public Works, and late mechanical master at this College, has been engaged to give lectures here on alternate weeks. Mr. Quinn's lectures on the construction of buildings, engine-driving, and other matters relating to buildings and machinery have been much appreciated, and are of very great value to students who intend going on the land.

There has been perfect harmony among the officers of the institution, and the work in every department has been carried on with exceptional vigour. It is pleasing to be able to report in this manner, because I have realised before now that want of *esprit de corps* among a teaching staff detracts considerably from successful progress in this and other similar institutions.

A careful perusal of the different sections of this report will, I think, convince anyone that the College is furnishing a liberal and thorough practical education to the students within its walls, and also disseminating by correspondence knowledge on various matters in connection with products raised from the soil, breeding, feeding, and raising live stock, &c., of inestimable value to this State. In fact, every branch of work in connection with the cultivation of the soil is receiving the best attention, and, it is thought, is being taught by competent officers. This includes agriculture in all its branches, both practical and theoretical, backed up by theoretical and practical chemistry, and experiments carried out on the farm, together with an up-to-date system of bookkeeping. The horticultural department comes in for a large share of attention, included with which are fruitgrowing and vine culture. Two hours per week are devoted to botany, and it may thus be seen that the students are made acquainted with the habits and growth of the different varieties of plant life. Dairying, in all its branches, is given the attention which I consider necessary to enable students to work their own dairies or to take the management of factories or creameries. The methods of breeding, feeding, and raising live stock are backed up by lectures and practical demonstrations by a qualified veterinary surgeon. Pig-raising, with bacon-curing, is also a branch of College work, and, being of very great importance, is given the necessary attention. Bee-keeping and poultry-raising are now carried on here on a reasonably large scale, or, at any rate, to such an extent as to enable students to acquire the necessary knowledge to undertake the business themselves. Sheep-breeding on a small scale is also a branch of College education. Blacksmithing, carpentry, and engineering are among the most popular branches of College work, and are given much consideration. English, arithmetic, mensuration and land surveying, and farm bookkeeping are given a good deal of attention. In fact, all matters from which young men going on the land are likely to derive benefit are carefully considered by myself and the teaching staff, and when a student has made rapid progress in class work, and has acquired a knowledge sufficient to fit him for a higher division, he is immediately transferred to a class in a more advanced part of the College teaching, and in which, by his careful study and energy, he has fitted himself to take part. There is no thought of turning out scientific men, but no effort is spared in aiding the development of men who will do credit to the institution as advanced agriculturists. This will be demonstrated by facts regarding the movements of ex-students, to be referred to later on in the report under the heading of "Progress made by ex-students."

In submitting this report, I propose to deal with each branch department separately. In reviewing the year's work, it is much to be regretted that, owing to the drought, I am unable to report favourably upon the results obtained from the labour bestowed upon the cultivation of the soil. Many crops were planted and never harvested, and the bright prospects, which were so promising in the early part of the year, were blighted by the continued drought, which detracted considerably from our success financially, and also added considerably to the keeping up of the institution, not only as regards the cost of fodder for our live stock, but also in the case of meat, bread, and other necessaries of life. Had we not had the misfortune to lose our conserved fodder by fire (referred to in my last report), the cost of feeding our stock would have been nil.

STUDENTS IN ATTENDANCE.—The number of students attending the College was, notwithstanding the very trying time, most satisfactory. During the first term, we opened with 53 on the roll, and 55 were enrolled for the second term. Eighteen left at the end of the first, and 20 new students joined during the second term. We had several students from New South Wales, and one from England.

SPECIAL SUBJECTS.—A number of students, at the request of their parents, were allowed to take up special lines of practical work, combined with indoor technical lectures, to fit themselves for the various branches of agriculture which their inclinations and circumstances led them to follow. These students are young fellows, for the most part over twenty years of age, and may be termed short, or special, course students. The best results accrue from this system, but the number must be limited, otherwise the "full-course" students must suffer through the crowding of a few of the most important departments.

During the first term of the year under review, there were seven specials—two gardening, two farm and dairy, two dairy, one gardening and dairy. In the second term there were thirteen—three farm, three dairy, two garden, four farm and dairy, one garden and dairy students. Another matter worthy of consideration with regard to adult short-course students is that they are old enough to at once take up the responsibility of managing their own affairs, whereas in the case of a lad, seventeen or eighteen years of age, he will be hardly old enough to enable him to be entrusted with a big responsibility, notwithstanding the fact that he may have had a first-class training in every branch of agriculture.

The conduct of the students, both in the field and classroom, has been, I am pleased to be able to state, exceptionally good, and, when allowance has been made for buoyancy of spirits, I must confess that their conduct right through has been most creditable. Officers in charge of the various departments report favourably in this connection.

In addition to the College teaching staff we have had the services of the following visiting lecturers:—Dr. A. G. Macdonald, first aid; J. F. Bailey, botany; W. C. Quinnell, veterinary science; Messrs. Voller and Rainford gave practical demonstrations in vine and fruit culture respectively; Mr. Quinn held classes in building construction and engineering. The assistance rendered by these gentlemen is worthy of my best thanks. Their work was much appreciated, and formed a valuable addition to the College teaching. I think I am justified in saying that the College teaching staff is of a high standing; and, while we do not claim to turn out in such a short period of instruction all-round experts, we do claim to be turning out young men well fitted to be successful in any branch of agricultural industry to which their inclination or circumstances may lead them. The following are the grade-sheets for December and June respectively:—

QUEENSLAND AGRICULTURAL COLLEGE.

Term Grade Sheet.—December, 1902.

Division.	—	Agriculture, Theory.	Arithmetic.	Botany.	Chemistry, Theory.	Chemistry, Practical.	Dairying, Theory.	Pig-raising and Bacon-curing.	Bookkeeping.	Elementary Science.	English.	Veterinary Science.	Animal Anatomy and Physiology.	Mensuration.	Horticulture, Theory.	Surveying.	Technical Drawing.	Building Construction.	Blacksmithing.	Carpentering.	Dairying, Practical.	Farming, Practical.	Gardening, Practical.	Conduct.	Diary.
Third.	H. G. Baker ...	61	...	...	48	56	81	52	...	...	...	60	...	...	...	25	20	18	60	60	60	90	77	90	52
	W. Chataway ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...		80	...	...	88	98	...
	D. Deighton ...	70	...	70	42	66	90	80	...	...	...	40	...	...	91	75	25	26	60	80	75	85	...	90	61
	W. Eastgate ...	50	...	...	83	76	60	50	...	...	...	...	...	...	...	...	...	...	60	80	...	75	80	75	13
	L. McCready ...	...	...	...	89	83	34	...	...	...	...	...	...	...	...	...	...	...	70	80	...	80	...	94	...
	T. Story ...	62	...	...	...	...	79	65	...	...	...	...	...	...	...	...	...	...	75	90	70	90	...	100	...
	A. Thynne ...	66	...	60	38	50	88	70	...	...	...	71	...	...	56	...	60	51	80	...	80	95	80	95	86
	F. Walker ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	95	...	...	95	89	85	...
Second.	G. Abraham ...	49	...	66	66	57	52	55	90	...	...	36	...	87	60	...	50	24	40	60	54	70	68	65	81
	F. Rouse ...	59	...	43	40	48	41	56	68	...	...	47	...	35	61	...	40	29	50	...	56	90	78	100	78
	P. Butler ...	72	...	65	77	83	89	89		...	...	59	...	69	70	...	49	26	60	70	60	80	83	75	79
	F. Calcino ...	61	...	79	66	64	51	61	94	...	...	74	...	65	62	...	...	23	53	60	60	70	77	90	78
	J. Curtis ...	66	...	...	83	80	77	90	...	...	...	43	...	78	70	...	...	33	60	...	65	90	85	90	85
	A. Davies ...	50	...	35	58	64	61	58	88	...	...	41	...	46	53	...	30	20	50	60	52	65	69	75	74
	L. Fudge ...	62	...	69	51	26	59	55	97	...	...	35	...	79	63	...	...	25	70	80	75	90	78	73	85
	D. McDonald ...	63	...	51	30	47	35	50	29	...	...	38	...	10	30	...	20	10	60	70	50	85	78	65	66
	C. Myers ...	50	...	13	32	18	52	57	25	...	...	52	...	1	59	...	25	15	70	60	50	80	65	78	63
	J. Nuttall ...	80	...	22	56	43	69	94	100	...	...	72	...	60	90	...	30	31	70	70	57	75	74	65	90
	F. O'Connor ...	65	...	...	40	76	61	82	...	...	...	45	...	...	70	...	...	24	80	90	...	90	65	100	...
	P. Price ...	60	...	65	43	49	71	64	85	...	...	46	...	27	63	...	29	16	60	70	54	90	77	90	71
	J. Purcell ...	61	...	51	51	71	68	66	39	...	...	65	...	41	62	...	20	24	60	70	58	70	68	88	88
	M. Shield ...	74	...	89	72	46	60	83	67	...	...	70	...	67	61	...	...	30	80	90	57	90	72	95	80
	D. Shine ...	50	...	35	38	47	68	60	83	...	...	69	...	23	67	...	50	30	50	60	40	70	53	75	66
	S. Smith ...	40	...	31	34	55	61	62	48	...	...	39	...	23	48	...	30	26	60	50	55	65	60	73	59
	F. Stumm ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	80		90	...	...	92	...
	L. Walters ...	40	...	13	40	48	69	66	49	...	...	67	...	12	39	...	20	11	50	50	53	65	68	70	79
	A. Webster ...	...	...	...	34	30	...	...	45	...	...	...	...	32	...	...	...	...	65	70	51	70	76	85	66
	H. Wolfe ...	63	...	...	39	58	69	60	26	...	...	...	...	13	...	...	30	11	50	60	44	70	55	71	72
First.	L. Alcock ...	53	33	42	...	...	71	50	...	54	45	...	0	...	45	...	...	...	50	60	56	90	81	70	67
	F. Clewett ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	90	90	...	100	...
	L. Corser ...	47	52	26	...	...	45	48	...	36	25	...	0	...	54	...	...	...	60	80	56	90	80	87	73
	A. Cran ...	54	30	6	...	...	50	50	...	45	59	...	0	...	40	...	...	...	50	70	60	85	74	75	55
	H. Dalrymple ...	75	25	66	...	...	50	71	...	59	69	...	20	...	64	...	...	...	60	80	56	80	80	75	49
	J. Devereux ...	46	2	...	...	...	69	57	...	24	44	...	...	...	50	...	...	...	80	90	56	90	80	95	58
	W. Donaldson ...	...	...	...	...	...	...	...	...	67		...	...	...	...	...	...	...	80	...	...	90	84	93	80
	O. Hardgrave ...	53	52	47	...	...	57	30	...	45	68	...	0	...	35	...	...	...	58	60	50	80	71	87	76
	W. Mahony ...	42	34	20	...	...	60	40	...	54	67	...	10	...	38	...	...	...	50	50	48	70	70	86	64
	D. Macansh ...	85	...	70	...	...	95	75	...	80	...	...	97	...	55	...	...	...	80	80	56	70	74	90	80
	P. McLean ...	81	59	32	...		72	75	...	79	50	...	56	...	70	...	...	...	90	85	...	90	70	90	78
	C. O'Connell ...	45	11	8	...	...	58	50	...	28	51	...	11		33	...	...	...	70	80	61	90	...	80	53
	E. Peirce ...	35	8	0	...	...	45	30	...	23	67	...	16	...	45	...	...	...	50	60	...	60	51	83	67
	E. Poulsen ...	76	78	48	...	...	93	58	...	74	55	...	35	...	60	...	...	...	60	85	58	70	68	88	75
	A. Smart ...	78	94	40	...	...	86	54	...	63	87	...	15	...	35	...	...	...	60	70	54	70	62	90	79
	L. Robinson ...	49	16	...	...	...	60	35	...	38	62	...	...	...	10	...	...	...	60		65	80	...	86	46
	R. Scott ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	70	70	50	95	82	100	...
	E. von Stieglitz	48	9	0	...	...	53	30	...	26	24	...	0	...	35	...	...	...	80	80	52	90	75	99	65
	A. Tate ...	...	4	0	...	...	40	10	...	12	34	...	0	...	41	...	...	...	60	...	40	50	58	75	64
	W. Taylor ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	80	85	...	...	88	85	...
	A. Thorn ...	45	7	9	...	...	51	43	...	14	25	...	0	...	44	...	...	...	60	85	50	90	75	90	64
	G. Newman-Wilson	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	70	...	55	85	80	100	...

QUEENSLAND AGRICULTURAL COLLEGE.

Grade Sheet.—June, 1903.

Division.	—	Agriculture, Theory.	Arithmetic.	Botany.	Chemistry, Theory.	Chemistry, Practical.	Dairying, Theory.	Pig-raising and Bacon-curing.	Bookkeeping.	Elementary Science.	English.	Veterinary Science.	Animal Anatomy and Physiology.	Mensuration.	Physics.	Surveying.	Poultry-raising.	Horticulture, Theory.	Blacksmithing.	Carpentering.	Dairying, Practical.	Farming, Practical.	Gardening, Practical.	Conduct.	Diary.
Third.	H. G. Baker ...	...	...	...	...	...	58	...	...	...	...	...	...	...	...	...	59	...	45	80	56	85	70	65	...
	F. Calcino ...	80	...	71	56	68	68	50	...	...	...	35	...	...	...	...	50	64	45	...	78	80	80	94	74
	W. Chataway ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	60	80	...	95	90	100	...
	S. Corser ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	60	...	...	90	...	70	...
	D. Deighton ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	55	90	90	90	...	100	...
	W. Eastgate* ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	60	70	58	85	70	50	0
Second.	G. Abraham ...	49	...	80	64	58	67	56	...	...	...	78	...	...	...	90	64	62	60	70	60	70	75	60	37
	F. W. Butler ...	67	...	54	64	65	82	75	...	...	...	76	...	...	...	90	60	70	70	...	80	80	80	65	70
	J. Curtis ...	64	...	40	74	66	75	80	...	...	...	75	...	...	...	90	64	85	70	90	80	85	80	85	77
	A. Davies ...	65	...	42	37	42	55	84	...	...	...	28	...	...	...	64	71	40	60	50	...	60	65	60	71
	J. Devereux ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	80	90	...	85	...	85	...
	L. Fudge ...	49	...	60	32	40	60	40	...	...	...	50	...	...	...	72	66	58	80	90	...	90	...	90	80
	D. McDonald ...	50	...	53	15	20	50	65	...	...	...	30	...	...	...	24	62	60	60	80	52	80	70	70	43
	J. Nuttall ...	75	...	24	33	50	57	76	...	...	...	62	...	...	...	75	60	85	70	...	55	75	85	85	91
	F. O'Connor ...	...	...	...	...	...	66	...	...	...	...	...	...	...	...	...	...	...	75	...	60	70	...	100	...
	P. Price ...	70	...	44	30	38	64	53	...	...	...	80	...	...	...	18	56	53	70	80	...	80	80	65	53
	J. Purcell ...	62	...	20	30	49	60	45	...	...	...	56	...	...	...	...	58	80	65	...	...	70	90	100	81
	M. Shield ...	70	...	74	56	38	60	85	...	...	...	60	...	...	...	78	53	65	80	90	...	80	80	95	63
	D. Shine ...	52	...	20	27	39	50	65	...	...	...	40	...	...	...	15	61	63	60	60	51	70	80	90	73
	E. von Stieglitz†	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	H. Wolfe ...	43	...	46	27	37	48	45	...	...	...	33	...	...	...	27	51	50	45	40	40	50	60	45	25
First.	F. Alcock ...	56	73	40	57	...	65	58	79	...	...	...	0	66	...	...	57	...	60	...	...	80	90	80	0
	R. Baker ...	40	32	25	22	...	56	55	44	...	...	...	0	34	...	...	40	...	65	...	48	74	65	100	81
	R. Bentley ...	60	81	60	12	...	60	52	85	...	...	...	7	72	...	...	54	...	50	...	58	70	...	100	81
	A. Blomfield ...	60	81	65	75	...	62	52	100	...	...	...	0	72	...	...	57	...	60	50	49	70	...	100	73
	T. Butler ...	56	64	51	25	...	51	40	78	...	...	...	16	75	...	...	0	...	50	70	47	60	...	65	82
	C. Cameron‡ ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	P. Callaghan ...	40	0	...	[illegible]	...	32	25	41	...	...	...	0	13	...	...	30	...	60	50	46	65	68	65	33
	H. Chambers ...	50	52	48	23	...	57	43	62	...	...	...	10	50	...	...	42	...	50	60	58	70	68	100	64
	L. Corser ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	60	...	57	85	...	85	...
	H. Dalrymple ...	65	48	46	50	...	70	80	52	...	...	...	19	44	...	...	59	...	65	90	60	80	85	85	0
	M. Fahy ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	60	40	...	85	...	85	...
	O. Hardgrave ...	62	77	60	42	...	53	35	38	...	...	...	14	65	...	...	58	...	60	...	42	75	65	65	76
	W. Heness ...	40	...	7	0	...	33	35	...	...	...	...	0	...	...	...	35	...	45	40	38	60	70	90	60
	H. Hillcoat ...	36	10	18	4	...	40	40	49	...	...	...	0	8	...	...	34	...	45	60	40	65	68	90	68
	J. Laidlaw ...	52	25	24	11	...	56	38	41	...	...	...	0	30	...	...	46	...	55	...	59	80	80	90	32
	H. Lamont ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	90	...	...	100	...
	J. Macansh ...	80	63	63	76	...	84	70	65§	...	...	...	95	70	...	...	46	...	60	90	75	80	90	55	24
	R. Macdonald ...	50	2	33	10	...	53	60	30	...	...	...	0	7	...	...	53	...	55	50	55	70	80	[illegible]	74
	W. Mahony ...	39	52	66	45	...	57	40	43	...	...	...	18	8	...	...	56	...	60	50	50	70	70	80	76
	P. McLean ...	68	89	.	80	...	75	75	84	...	...	...	abs.	57	...	...	59	...	80	90	65	85	...	90	77
	J. Muir... ...	50	...	...	...	...	56	...	...	...	...	...	...	...	...	...	59	...	70	...	60	80	80	100	...
	C. O'Connell ...	54	4	...	...	...	48	50	33	...	...	...	0	8	...	...	51	...	60	...	...	70	70	70	29
	E. O. Peirce ...	45	10	31	31	...	39	43	18	...	...	...	5	1	...	...	52	...	55	50	40	70	69	60	66
	J. M-Prior ...	45	27	35	5	...	47	35	64	...	...	...	5	14	...	...	49	...	50	...	...	70	62	100	67
	J. Proud† ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	R. B. Ralfe ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	G. Robertson ...	50	45	51	26	...	65	72	98§	...	...	...	12	12	...	...	70	...	50	40	59	75	75	94	83
	R. Scott	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	70	...	...	90	...	100	...
	A. Smart ...	71	91	59	65	...	68	60	79	...	...	...	32	64	...	...	60	...	60	80	57	70	72	70	45
	R. Smythe ...	78	44	40	43	...	56	45	68	...	...	...	51	31	...	...	80	...	60	80	...	65	70	95	80
	A. E. Tate ...	30	...	...	...	...	25	...	...	...	...	...	...	...	...	...	...	...	40	...	56	50	...	60	...
	W. E. Taylor ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	80	...	68	85	80	80	...
	A. Thorn ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	60	90	56	85	80	85	...

* Absent from examinations. † Withdrew at mid-term. ‡ Absent through illness during greater part of term. § Diploma paper.

Agriculture—First Year, June, 1903.

Maximum, 100; Credit, 75; Pass, 50.

Time—2 hours.

1. (*a*) What is the object of cultivation? (*b*) In what way does the mechanical texture of soils influence the growth of plants? (*c*) State how fertility may be increased by natural means? (*d*) How does cultivation of the surface soil prevent evaporation? (*e*) What are the sources of plant food?

2. (*a*) Classify soils from an agriculturist's standpoint. (*b*) Describe what you would claim to be a first-class agricultural soil. (*c*) State indications of barrenness and fertility of soils from a casual inspection of same.

3. (*a*) What is meant by a soil becoming exhausted, and how does this condition arise? (*b*) What is the difference between a naturally sterile soil and a soil exhausted by continuous cropping? (*c*) State how the inactive ingredients in soils become active. (*d*) How does fallowing improve the fertility of the soil? (*e*) What condition of the soil would induce you to adopt a system of green manuring?

4. State the class of soil which you would consider suitable for the growth of—(*a*) wheat, (*b*) oats, (*c*) barley, (*d*) rye, (*e*) maize, (*f*) lucerne, (*g*) root crops.

5. (*a*) State the method of cultivation you would adopt for the successful growth of cereal crops. (*b*) Treatment of seed before planting. (*c*) Quantity of seed per acre and method of cultivating after planting, and cost of same? (*d*) What is meant by a rotation of crops?

6. State how you would be guided as to when cereal crops are ready for harvesting—(*a*) for grain, (*b*) for hay. (*c*) Give approximate cost of harvesting and stacking same. (*d*) What do you consider to be a good yield per acre for wheat, barley (malting), oats, and rye respectively? (*e*) What is considered to be a good yield of hay per acre from the following crops:—Wheat, oats, panicum, and lucerne respectively?

7. (*a*) State the class of soil which you would select upon which to grow lucerne. (*b*) Method of preparing the land for growth of same. (*c*) Depth of planting, and quantity of seed per acre. (*d*) What is considered to be a good yield of lucerne hay per acre? (*e*) At what stage of growth should lucerne be cut for hay-making purposes?

8. (*a*) State what you know about the class of soil suitable for the growth of root crops, and method of planting same. (*b*) What do you consider to be a good yield of potatoes, (*c*) Swede turnips, (*d*) carrots, (*e*) beets?

9. (*a*) What is the object of drainage? (*b*) What class of soil needs drainage most? (*c*) Is it necessary to have the land well drained before adopting a system of irrigation? Why? (*d*) Write what you know about the methods of applying water on the garden and on the lucerne land. (*e*) Would you use any precaution regarding the application of water if the nature of the subsoil was unfavourable?

10. State what you know about manures, and their application to different soils and various crops.

Agriculture—Second and Third Year, June, 1903.

1. (*a*) What are soils? Of what do they consist? What form the inorganic and organic constituents of the soil? (*b*) Name the soils which you consider to be the most fertile. (*c*) What soils are best adapted for the absorption and retention of moisture?

2. (*a*) In what way may soils be benefited by drainage? (*b*) What soils need drainage most? (*c*) State how you would be guided in laying out a system of drainage? (*d*) What effect has badly drained soil on plant life?

3. (*a*) State the methods of cultivation you would adopt to enable you to obtain the best results? (*b*) Do you approve of deep cultivation? If so, why? (*c*) Do you recommend bringing a large quantity of the subsoil to the surface? State what you know about this matter. (*d*) State what you know about the nitrification of soils. By what means is it brought about?

4. (*a*) What is gained by a rotation of crops? (*b*) State the lines on which you would carry out a system of rotation.

5. (*a*) State what you know about barnyard manures and their value from the different sources. (*b*) Name methods you would adopt in saving same. (*c*) Methods of application to the land. (*d*) Write what you know about artificial manures. (*e*) How would you be guided as regards the requirements of manures for the various soils? (*f*) What condition of the soil would induce you to apply manures? (*g*) State the manures that are favourable to the growth of different crops.

6. State briefly what you know about the methods of planting, and quantity of seed required per acre, for the following crops:—(*a*) Barley, wheat, oats, rye, maize. (*b*) Cowpea, field-peas, beans, lucerne. (*c*) Sorghum, amber-cane, broom millet, Hungarian millet, panicum. (*d*) Root crops, carrots, mangolds, Swede turnips, beets, potatoes, onions.

7. State what you know about harvesting cereal crops (*a*) for grain, (*b*) for hay. (*c*) State what you know about harvesting and saving lucerne; also yield of hay per acre.

8. (*a*) State what you know about the feeding and care of horses and cattle kept on the place. (*b*) Describe how you would tell the age of a horse, (*c*) a sheep, (*d*) horned cattle.

9. (*a*) State what you know about the daily ration for a working horse, (*b*) a milch cow. (*c*) Does shelter cause a saving of food? If so, why? (*d*) Name the foods that are most suitable for milk production. (*e*) Name most economical food.

10. (*a*) State what you know about the crops most suitable for ensilage. (*b*) Value of ensilage as a food for stock. (*c*) What chemical change takes place during the process of siloing? (*d*) Give brief description of a silo and methods of filling same.

Arithmetic—First Year, May, 1903.

1. Divide 8·31183 by 23·05, and 8311·83 by ·02305.

2. Find the net return to a farmer who consigns 10 tons 16 cwt. 3 qr. 21 lbs. of chaff to an agent; the selling price of the chaff being £4 per ton; expenses paid by agent, £4 4s. 4d.; and commission, 5 per cent.

3. Check the computation of the value of the above consignment by decimal method.

4. How many working hours will it take a mower with 4-feet cut, travelling at an average rate of $1\frac{1}{2}$ miles per hour, to cut out a paddock of 16 acres?

5. Which is the best dairy cow, judging by the following tests:—

$$a\begin{cases}\text{Morning, 14 lbs. milk; Babcock test, 4·6;}\\ \text{Evening, 12 lbs. milk; Babcock test, 4·9?}\end{cases}$$
$$b\begin{cases}\text{Morning, 13 lbs. milk; Babcock test, 5·3;}\\ \text{Evening, 11 lbs. milk; Babcock test, 5·4?}\end{cases}$$
$$c\begin{cases}\text{Morning, 20 lbs. milk; Babcock test, 3·2;}\\ \text{Evening, 17 lbs. milk; Babcock test, 3·6?}\end{cases}$$

Give yield of commercial butter in each case.

6. Find simple interest on £325 3s. 9d. for three years 73 days at $3\frac{3}{4}$ per cent.

7. Multiply £2 16s. 10·75d. by 144·33; and divide £4,753 14s. 7·95d. by 234·5.

8. A bankrupt owes £9,632 6s. 3d.; his assets are £5,618 16s. $11\frac{3}{4}$d.; how much can he pay in the £?

9. For what sum should a cargo, worth £5,263, be insured at $7\frac{2}{3}$ per cent., so that in case of loss the owner may recover the value both of cargo and premium?

10. Find compound interest on £3,750 at 5 per cent. for 3 years.

11. A man buys 5 tons 7 cwt. 2 qr. of potatoes at £1 per ton; his expenses on the same amount to £2 15s. He sells at 2s. per quarter. Find his total gain, and gain per cent.

12. How many roots of *Paspalum dilatatum* grass will be required to plant an area of 4 acres 2 roods 15 perches, the roots being set 3 feet 6 inches apart each way?

Theoretical Chemistry—Second and Third Year.

1. Give the names and formulæ of the phosphates of lime used as manures, stating in what manures the different phosphates occur, their relative manurial merits, and their origin. Give equation representing the action of sulphuric acid upon bone-dust?

2. Compare the manurial values of excreta from cattle and horses. Make a comparison between the use of farmyard manure and artificial manures.

3. You wish to apply to the land 40 lbs. nitrogen, 62 lbs. potash (K_2O), and 40 lbs. phosphoric acid (P_2O_5)—how much ammonium sulphate, potassium sulphate, and superphosphate must be used? Assume that the ammonium and potassium salts are pure, and that the superphosphate contains 28·01 per cent. of lime—

$$H = 1,\ N = 14,\ O = 16,\ K = 39·1,\ S = 32,\ Ca = 40,\ P = 31.$$

4. Name the principal constituents in a fodder, and state their functions. Calculate the value of the following feed:—1 lb. lucerne hay, $\frac{1}{2}$-lb. wheaten chaff, $\frac{1}{4}$-lb. molasses.

	Lucerne Hay.	Wheaten Chaff.	Molasses.
Dry R. Matter ...	91·6	90·4	75·0
B. P. ...	14·3	3·4	...
C. ...	42·7	43·4	70·0
F. ...	2·2	1·3	...

5. Mention some salts which at times render water unfit for irrigation. A water contains :—

Cl, grammes per 1,000 c.c.	1·0973
SO_3, grammes per 1,000 c.c.	·1147
CaO, grammes per 1,000 c.c.	·0803
Na_2O, grammes per 1,000 c.c.	·9495
K_2O, grammes per 1,000 c.c.	·0785

What salts are probably present, and in what proportions? ($Cl = 35·37$.)

Practical Chemistry—Second and Third Year.

First portion.

Determine qualitatively the bases and acids in the four given substances.

Second portion.

A. Find the amount of ferrous iron in given solution. Describe the method of determination, giving the reactions which take place.

B. Determine volumetrically the chlorine in given sample of water (answer in grammes per 1,000 c.c.). Describe the method of determination, and give the reactions which take place.

Theoretical Chemistry—First Year.

1. State what you can about oxygen. What is said to occur when it combines with other elements? Give some examples of such combinations.

2. Tell all you can about nitrogen. Describe the value of Nitrogen to a farmer, and by what means and in what substances it is made use of by him.

3. Explain the following terms, giving examples :—Element, compound, salt, acid, alkali.

4. What is the composition of water? State some means of decomposing water. Explain the term, "the point of maximum density of water" Why does water boil at lower temperatures at great heights? Give laboratory experiments illustrating this phenomenon.

5. What is the thermometer? Name and describe the two thermometers commonly used. Convert 50 degrees F. into degrees C., 25 degrees C. into degrees F.

6. State what you know about carbon dioxide, its properties, where it occurs. How can it be formed in the laboratory? Give equation.

7. What do you understand by plant foods? Name the four most important. Mention the substances containing these plant foods used by the farmer.

8. How many tons of limestone must be treated to form 5 tons of quicklime. $Ca, C, O_3 = CaO + CO_2$ $Ca = {}_4O, C = 1_2, O = 16$.

Dairying—Second and Third Year.

1. State what precautions you would take in building up a dairy herd Give a brief description of the points of a good dairy animal. What do you consider to be a good yield of milk per cow for a milking period of nine months?

2. State what you know about the feeding and rearing of calves, quantity of milk per day, age at which they should be weaned, results from neglect and bad rearing.

3. Give a brief description of the methods you would adopt in feeding dairy stock to enable you to obtain the best results. What are the most economical foods for milk production? State what ingredients a well-balanced ration should contain: what quantities of the different foods do you consider to be a daily ration?

4. Give constituents of fresh whole milk, with brief notes on each, and state how they are distributed in cheese-making.

5. Explain method of the pasteurisation of cream, and state how such treatment would benefit the industry in this State.

6. Give method of preparing pure lactic acid starter for cream-ripening; explain the use and benefits accruing therefrom.

7. Write an essay on cheese-making.

8. Write an essay on butter-making and packing for export.

9. Give composition of—(*a*) commercial butter, (*b*) cheese, (*c*) specific gravity of whole milk and of cream.

10. Would you advise the grading of cream received at factories? And, if so, give reasons and the characteristics of each grade.

Dairying—First Year Students, June, 1903.

1. Write an essay on the proper method of milking.

2. Explain the treatment of milk after it has been drawn from the cow, and previous to its being forwarded to the factory or used for the manufacture of dairy products.

3. Give (*a*) composition of milk, (*b*) temperature of milk when drawn from the cow, (*c*) temperature suitable for separating.

4. Explain the principle of a cream separator.

5. Explain how you would treat the cream previous to churning, and your reasons for doing so.

6. Write an essay on churning.

7. The yield of milk and average test for the month of January last of the following cows being given, find the yield of commercial butter from each cow:—

"Rosebud,"	1,055 lbs. of milk,	testing	3·6	per cent.	butter fat.	
"Kit"	858 ,,	,,	,,	4·0	,,	,,
"Ivy,"	622 ,,	,,	,,	4·8	,,	,,

8. (*a*) State the lines you would follow in building up a dairy herd. (*b*) Name some of the breeds of cattle best adapted for milk production. (*c*) What means would you adopt to improve the present Queensland dairy herds? (*d*) Would you give any consideration in selecting cattle to be kept on various classes of country? (*e*) What means would you adopt to keep your herd free from disease?

9. (*a*) Explain briefly the most important points to be observed in selecting a dairy beast. (*b*) Would the good qualities of a show ring beast be a sufficient guide for you to make a purchase? (*c*) State the lines upon which you would rear calves, age at which they should be weaned, and other matters of importance in this connection.

10. (*a*) State what you know about feeding milch cows, and most suitable and economical foods. (*b*) A daily ration. (*c*) A well-balanced ration. (*d*) What crops are the best and most economical for the purpose of siloing? (*e*) What chemical change takes place in the saving of ensilage?

Pig-raising and Bacon-curing—Second and Third Year Students, June, 1903.

1. State what steps you would take in selecting and laying out a pig farm, including necessary buildings, &c.

2. What methods would you adopt to build up a herd of pigs? What breeds do you consider to be most profitable for bacon pigs?

3. (*a*) State what you know about the feeding and rearing of pigs. (*b*) At what age should pigs be weaned? (*c*) Castrated? (*d*) State age at which pigs should be fattened.

4. (*a*) What amount of flesh should a well-fed pig gain daily, *i.e.*, when the animal is well grown and first placed in the fattening pen? (*b*) What amount of food is a sufficient daily ration for a pig as above? (*c*) What is the difference between the live and dressed weight of a well-fed pig?

5. Write an article on bacon-curing?

Bookkeeping—First Year, May, 1903.

1. Enter the following transactions in the ledger, close accounts, ascertain the amount of profit or loss, also capital, and make out the final balance-sheet:—

		£	s.	d.
July	1.—Value of land, stock, &c.	1,280	0	0
,,	1.—Cash in hand	8	15	6
,,	1.- Cash in bank	85	10	0
,,	1.—Williams owes me	7	15	0
,,	1.—Creamery Co. owes	25	7	0
,,	1.—I owe Overell	3	15	0
,,	1.—I owe Daniel	1	19	0
,,	3.—Creamery Co. settle last month's account.			
,,	5.—Sell Daniel 5 fat bullocks at £6 each	30	0	0
,,	6.—Settle Overell's account.			
,,	7.—Supplied Creamery Co. for week	5	19	0

	£	s.	d.
July 8.—Sell Williams 4 tons 10 cwt. chaff at £3 per ton ...	13	10	0
„ 10.—Sell for cash 5 weaner pigs at 12s. 6d. each ...	3	2	6
„ 10.—Pay contractor for 20 chs. fencing at 10s. per chain	10	0	0
„ 11.—Buy for cash single-furrow plough	5	0	0
„ 14.—Supplied Creamery Co. for week	6	8	0
„ 15.—Sell for cash Jersey bull	10	10	0
„ 17.—Pay blacksmith for shoeing and repairs	2	8	0
„ 19.—Sell Daniel 6 lambs at 10s. each	3	0	0
„ 21.—Supplied Creamery Co. for week	6	7	0
„ 22.—Sell Williams 40 bus. maize at 3s. per bus. ...	6	0	0
„ 24.—Buy from Overell cornsheller	3	10	0
„ 26.—Williams settles his account in full.			
„ 28.—Supplied Creamery Co. for week	6	7	6
„ 29.—Buy for cash draught mare	12	10	0
„ 31.—Supplied Creamery Co. from 28th	3	15	0
„ 31.—Owe Overell for groceries	3	8	0
„ 31.—Owe Daniel for meat	2	1	0
„ 31.—Owe Finney, Isles for drapery	5	15	0
„ 31.—Personal expenses for month	2	11	0
„ 31.—Paid for wages for month	7	10	0
„ 31.—Value of land, stock, &c.	1,250	0	0

2. Into what three classes may accounts be divided? Under what headings will each of the accounts in the foregoing ledger be placed?

3. How would you enter the following transactions in ledger:—

July 8.—Sell Jones 80 bus. maize at 3s. £12 0 0

„ 10.—Jones pays for maize, less 5 per cent. discount.

MENSURATION—FIRST YEAR, MAY, 1903.

1. From a rectangular paddock, the width of which is 1,523 links, it is required to fence off $11\frac{1}{2}$ acres; what length will it be necessary to cut off?

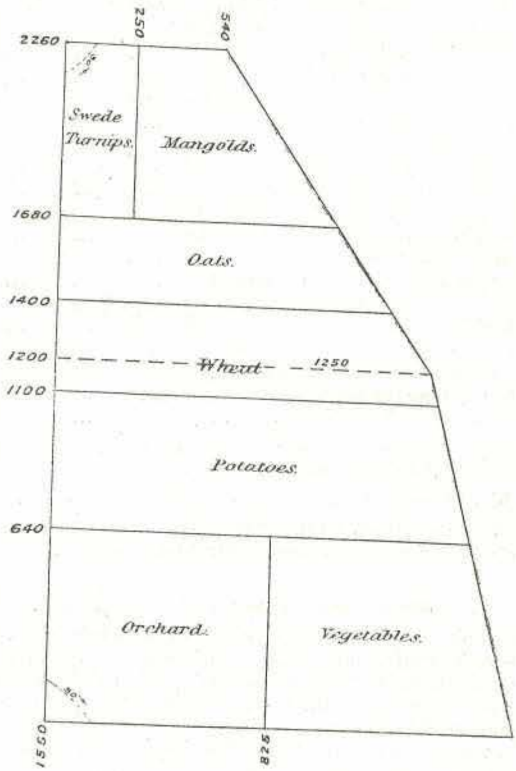
2. In erecting the framework of a hayshed, 19 feet wide, to be roofed with 6-feet iron, what pitch must be given to the roof, allowing 1 foot on each side for overlap of iron and projection beyond eaves?

3. Calculate area of triangle the sides of which measure respectively 500, 530, and 600 links; and find value of the land at £6 10s. per acre.

4. Compute area from field notes, and draw plan of land as nearly to scale as possible.

	△	
	1500	
	1320	360
280	1280	
520	970	0
	650	240
620	490	
	370	326
	△	

5. Make out field-notes for survey of block given below, compute area of each variety of crop, and check same by whole area.



SURVEYING—SECOND YEAR, MAY, 1903.

1. In the following survey, compute omitted bearing and distance, close figure, and calculate area:—

			Bearing. Deg.	Min.		Distance.
Station 1 to 2	...	...	87	30	...	1,500 links
" 2 to 3	...	...	165	21	...	2,800 "
" 3 to 4	...	...	288	50	...	500 "
" 4 to 5	...	...	00	12	...	1,000 "
" 5 to 1	...	...	Omitted		...	Omitted

2. From the following field-notes, compute rise, fall, and reduced level; also calculate quantity of earth in cubic yards to be removed to complete cutting:—

Back sight.	Intermediate.	Fore sight.	Distance.	Remarks.
13·90	...	...	0	Start of proposed cutting.
...	8·70	...	33 feet	
12·80	...	·30	66 "	
...	5·20	...	99 "	
...	2·10		132 "	
2·40	...	5·80	165 "	
...	...	5·00	198 "	End of proposed cutting.

Width of roadway to be 15 feet, slope of sides 1 horizontal to 1 vertical.

POULTRY-RAISING AND BEE-KEEPING—FIRST YEAR STUDENTS, JUNE, 1903.

1. State which are the best breeds for egg production; also whether they are sitters or non-sitters.

2. Which breeds are the best for all-round purposes, laying and table combined?

3. Which of the pure breeds make the best table birds?

4. What is the best food for egg production, and how many times per day should fowls be fed?

5. State which two pure breeds would produce the best cross-bred fowl—(*a*) considering early maturity and early laying, (*b*) a good market fowl.

6. State what you know about bee-keeping, naming the best kind of bees to keep for extracted or comb honey. How much honey would you expect from each hive in a year?

Horticulture.

1. Give as fully as possible the necessary points to be considered when choosing the situation for a garden.

2. Describe the preparation of land for the cultivation of cabbages, cauliflowers, carrots, and beets; give distances to plant apart and thin out respectively; and name the kind of soil that suits them best.

3. What pests are troublesome to cabbages and cauliflowers, and how can they be checked? Give names and proportions of the various sprays.

4. What advantages are obtained by having level or slightly sloping land for a garden?

5. Describe the cultivation of land for a garden, giving the advantages of well-worked soil.

6. Is drilling or broadcasting most satisfactory in a garden? Give reasons for your opinion.

7. Give a full description, regarding preparation, of a seed bed from digging until the plants are fit for lifting.

8. Give a list of vegetables always sown in seed beds and afterwards transplanted, and a list of those that do best when drilled in.

9. How should young plants be treated when being removed from the seed bed? When is the most suitable time for transplanting?

10. What results are obtained from mulching? Give suitable material for same.

Particulars as to Occupations of Ninety-five College ex-Students.

A. E. Anderson.—Assistant to Dr. Maxwell, Sugar Bureau, Bundaberg.

P. M. Bayley.—During past three years has held the dual positions of manager and secretary of Pittsworth cheese factory. Handles 1,200 gallons of milk per day during a good season.

C. H. Culpin.—Fruit-growing, Blackall Range, near Eumundi.

A. E. Dyne.—Farming on the Maroochy River. Advises that he intends growing bananas on a large scale.

H. Dyne.—Working with his brother (A. E. Dyne) until recently. At present in Brisbane temporarily, engineering works.

A. E. Holcombe.—Farming on his own selection, Lockyer district.

E. R. Isaacs.—Working a farm, the property of his father, seven miles from Murwillumbah.

G. W. Jackson.—In charge of vegetable garden and orchards, Queensland Agricultural College.

A. A. Nott.—Field manager and cane inspector, Windermere sugar plantation, Bundaberg.

F. H. Palmer, W. Palmer, N. W. Philp.—Working a large farm in the Fassifern district. Are at present milking 48 cows. Had 30 cows in milk throughout the drought, losing one head only.

J. H. Preston.—Practising as a dentist in North Queensland.

R. Sigley.—Managing a large dairy farm, the property of Mr. E. J. Metcalfe, of Toowoomba, at Wyreema.

H. C. Webb.—Employed at Willowburn butter factory, near Toowoomba, as manager.

B. Whitehouse.—Engaged in mixed farming, in partnership with his brother, on 640 acres of land, on Laidley Creek.

S. Wilson.—Clerk in firm of G. H. Wilson and Co., Ipswich.

A. Conachan.—Pastoral pursuits, Kabra, Rockhampton.

W. McIlwraith.—Lucerne-growing, Laidley. Secretary to the Lockyer Agricultural and Industrial Association.

F. G. Johnson.—Managing farm for his brother at Ingham, North Queensland, with (his brother writes to say) every success. Has lately purchased 200 acres sugar land, which he intends to work on his own account, in conjunction with his brother's property.

E. F. Youngman.—Engaged in fruit-growing at Montville, Blackall Range.

W. R. Gillham.—Working father's farm at Eulaberg, Glen Innes, New South Wales.

J. W. E. Henry.—No reply.

L. C. Stupart.—Writes to say that he is on the Blackall Range on the lookout for a fruit farm. Advises that he will write later as to his success.

F. B. Shine.—Learner in Post and Telegraph Department, Ipswich.

W. C. Burn.—His mother advises that this student is now on the permanent staff of the Colonial Sugar Refinery Company, and is stationed on the Wai Levu Estate, Labasa, Fiji, in charge of the field work.

F. L. Jones.—Farming 247 acres three miles from Childers, with his two brothers. Has 60 acres under cane and other crops; intends later to enter largely into the dairying industry.

W. H. Mayne.—No reply.

C. Barth.—Farming on a large scale near Clifton, on an area of 1,000 acres; has 300 acres under lucerne, 450 under wheat and barley; has lately purchased 3,000 store sheep in New South Wales for fattening purposes; is able, from knowledge gained at the College, to do all his own carpentering and blacksmithing.

A. McKinnon.—Farming on his own account on selected land forming part of the Gowrie repurchase. States that by next month he will have 70 acres of wheat, 40 acres malting barley, and 5 acres mixed crops, and will be milking about 30 cows.

J. Redmond and E. J. Redmond.—Farming near Bundaberg, principally growing lucerne and vegetables. Have installed an irrigation plant, which has proved most remunerative. Intend planting 40 acres cane.

E. P. Noakes and B. Noakes.—Mr. J. E. Noakes, the father of these ex-students, writes that they are working a farm at the Isis; have 25 acres under sugar-cane, besides maize, sweet potatoes, and other crops.

F. Boase.—Mining pursuits, Gympie.

M. R. Fox.—Fruit-growing, Cleveland. Is forming an orchard to consist of 18 acres. Has at present $2\frac{1}{2}$ acres planted with pineapples, &c., and hopes to have the remainder planted out by next year.

H. B. Corser—Farming on his own account 1,000 acres of good agricultural and dairying land 23 miles from Degilbo. Has been busy fencing, erecting necessary buildings, clearing land for cultivation, &c. Has 60 head good milking cows, and has lately purchased an Ayrshire bull from the College. Has about 15 acres under cultivation, but intends to largely extend this area in the near future.

H. Youngman.—With cousin, E. Youngman, fruit-growing, Montville.

J. B. Anderson.—In company with his brothers has taken over his father's dairying property at Ashgrove, Waterworks road. Is doing well.

F. Bray.—Until lately has been engaged in the dairying industry at Murwillumbah, New South Wales. Has now accepted an appointment from the Colonial Sugar Refinery Company, and gone to Fiji. Does not specify nature of new occupation.

F. Butterworth.—Engaged in working a farm of 120 acres for his father near Toowoomba. Hopes shortly to be in a position to take up a larger place.

J. W. Evans.—Farming near Rosewood, growing vegetables and fruit, besides other crops, on a large scale.

A. W. Kibble.—No reply.

Thos. Kidd.—Managing farm for his father at Grange Hill, in the Kolan district.

F. F. Fifett.—Has formed a very successful fruit farm near Woombye, North Coast Railway. Has lately taken up a farm on the Darling Downs, near Meringandan, where he intends to follow mixed farming.

W. P. Campbell.—Engaged in the engineering business in Brisbane.

R. L. Armour.—Engaged in commercial pursuits, Hoffnung and Co., Brisbane.

C. Atherton.—Engaged in pastoral pursuits, Nickavilla Station, Adavale.

E. B. Bushnell.—Engaged in pastoral pursuits, Nanango district.

D. Farmer and C. Farmer.—C. Farmer writes to say that his brother and himself are engaged in pastoral pursuits in the Port Curtis district, near Gladstone.

H. P. Frederich.—Dairy-farming on a selection of 750 acres near Mudgeeraba. Milk from 50 to 75 cows. Has been very successful with pigs. Has about 100 acres under cultivation.

A. G. Lorenz.—Engaged in farming with his father at Back Plains, Clifton.

C. S. McClymont.—At present stock-riding for his uncle at Wyalla. Intends to select on his own account when suitable land available in the district.

W. Rutkin.—Living with parents in Gympie. Was forced to give up farm work on account of bad health, but hopes to give it another trial in the near future.

J. D. Ryan.—Dairying and farming (principally wheat-growing near Yeulba). Hopes to have 300 acres under wheat next season.

T. S. Sommerville.—Member of firm of J. R. Smith and Co., auctioneers, Clifton; also farming Ercildeane, King's Creek.

F. Harding.—Engaged in mixed farming in the Esk district, near Cressbrook. Being too far from the railway to supply cream to factories, he makes his own butter, and cannot supply the existing demand.

F. Moloney and H. Moloney.—With their uncle in Western Australia, engaged in pastoral pursuits.

H. L. Noyes.—Was for some time engaged in engineering work in Messrs. Johnson and Sons' tannery, and also with Messrs. Traills, Ltd.

H. B. Radford.—No reply

H. Schneider.—Assisting his father, farm and survey work, at Nerang.

C. W. Stumm and F. E. Stumm.—These ex-students advise that they, with another young fellow, are engaged in dairying and grazing on a selection of about 2,500 acres which they have purchased.

E. T. Watson.—No reply.

E. A. Byrne.—Was for some time trying to procure a suitable dairy or fruit farm, but abandoned the attempt on account of the drought then existing.

D. W. Dunlop.—Engaged in farming with his father at Biarra.

H. Lamond.—Working on sheep station, Maneroo, near Longreach. Writes a long description of the drought and its effects in his district.

W. D. North.—Engaged in commercial pursuits, with the Australian Estates and Mortgage Company, Brisbane.

H. Cullinane.—Assisting father in business (drapery), Bundaberg.

C. Rowland.—Cane-farming and dairying, Burnett Heads, Bundaberg.

C. Alford.—Clerk in Bank of New South Wales, Ipswich.

L. Alford.—Dairying and gardening with brother at Bororen, North Coast Railway.

F. Cockerill—Working with father at Old Jumna Station (cattle), Burnett district.

V. Field.—Mixed farming. Managing farm belonging to a Mr. Godtfredson, near Bowen.

A. Fountain.—Working on his father's farm (fruit) on Buderim Mountain. Advises that he hopes soon to be on a farm of his own.

R. Robinson.—Managing dairy farm for Mr. Long, of Habana, milking 45 cows.

G. Thaler.—Fruit-growing and mixed farming on Scrubby Creek, near Charters Towers. Advises that, by means of irrigation, he realised large profit from citrus fruits during drought.

G. P. Jenkins.—Was for some time in charge of refrigerating plant at Moree, New South Wales. Has since been travelling to introduce a new calf food, "lacto-farina."

L. McCready.—Engaged under Dr. Maxwell, Chief Sugar Bureau, Bundaberg.

A. J. Thynne.—Engaged in dairying and citrus fruit-growing on the Blackall Range, near Landsborough.

F. Walker.—Dairying in Tweed River district, New South Wales.

F. T. Bowler.—Dairying pursuits, near Bangalow, Lismore, New South Wales.

G. Myers.—No reply.

S. Smith.—Dairying pursuits near Marburg.

A. Webster.—No reply.

F. Clewett.—Now at Talgai West, with a view to gain further knowledge of stock-raising and dairying.

A. Cran.—Engaged in mixed farming on his father's farm at Iindah, Maryborough.

E. Poulsen.—Writes that he is getting together cattle for his father's farm on the Mary River, near Gympie. It is his intention to manage the farm (1,000 acres) for his father.

G. Newman Wilson—Writes that he is purchasing a block of land at Mapleton, on the Blackall Range, where he intends to grow fruit.

M. B. Marley.—Advises that he is starting an orchard at Ballandean, and has 5 acres of land ready for planting this season. His residence has just been completed.

L. Robinson.—In company with his brother has leased 100 acres of land on Telemon Station, near Beaudesert. He has lately been hard at work clearing, has 40 acres cleared, of which 20 acres are planted with oats.

J. Proud.—Is now manager of a large butter factory at Korumburra, Gippsland, Victoria. He advises that 30 hands are employed in the factory and cream wagons; 100 cans of cream are received daily by rail in the season, in addition to what the wagons bring. He further states that he gained the position, for which there were 45 applicants, largely through his College diploma.

P. Cusack.—Engaged in mining, Ravenswood Gold Field.

Summarised, the present occupations of the 95 students concerning whom inquiries were made are—

General farming	33
Dairying	18
Grazing pursuits	11
Horticulture	10
Other pursuits	13
Number who did not reply or did not state the occupation followed	10
Total	95

Mr. P. M. Pitt, English and Mathematical Master and Secretary, in his report states that during the year under review 24 students were examined by him in Arithmetic for Entrance Examination, and, as usual, the results obtained in this subject were most unsatisfactory, 7 only gaining 50 per cent. and upwards of the marks. Mr. Pitt further states that, judging from the students who join this institution, very little attention appears to be paid in the majority of schools to a thorough grounding in this subject. As regards College work, Mr. Pitt reports: "During the period under review I have taken classes in English, Arithmetic, Mensuration, Surveying, and Bookkeeping.

English.—This is the most unsatisfactory subject with which I have to deal, and I regret to say that I cannot report good progress. As many of those who join us cannot spell correctly, and have a very vague knowledge of the meanings and uses of words in common use, it may therefore be seen that it is absolutely impossible to effect much improvement in the short time at my disposal. Moreover, it has been found that, however much they need it, lads over the age of fifteen years consider such elementary work as spelling, &c., to be "beneath their dignity," and no force or encouragement that may be brought to bear upon them will effect much improvement. I do not see, considering the number of subjects of a more practical nature with which we have to deal, and the limited time at our disposal, how more time can be devoted to the subject of English, nor do I consider it fair to ask us to take up elementary work which should have been taught elsewhere.

Arithmetic.—Although the backwardness and want of grounding in the case of many students necessitate a large amount of elementary work in this subject, good progress has been made, and I think I may safely say that a decided improvement has taken place. This subject is taught for a period of twelve months, and the time allotted to it averages two and three-quarter hours during the first and two hours per week during the second term.

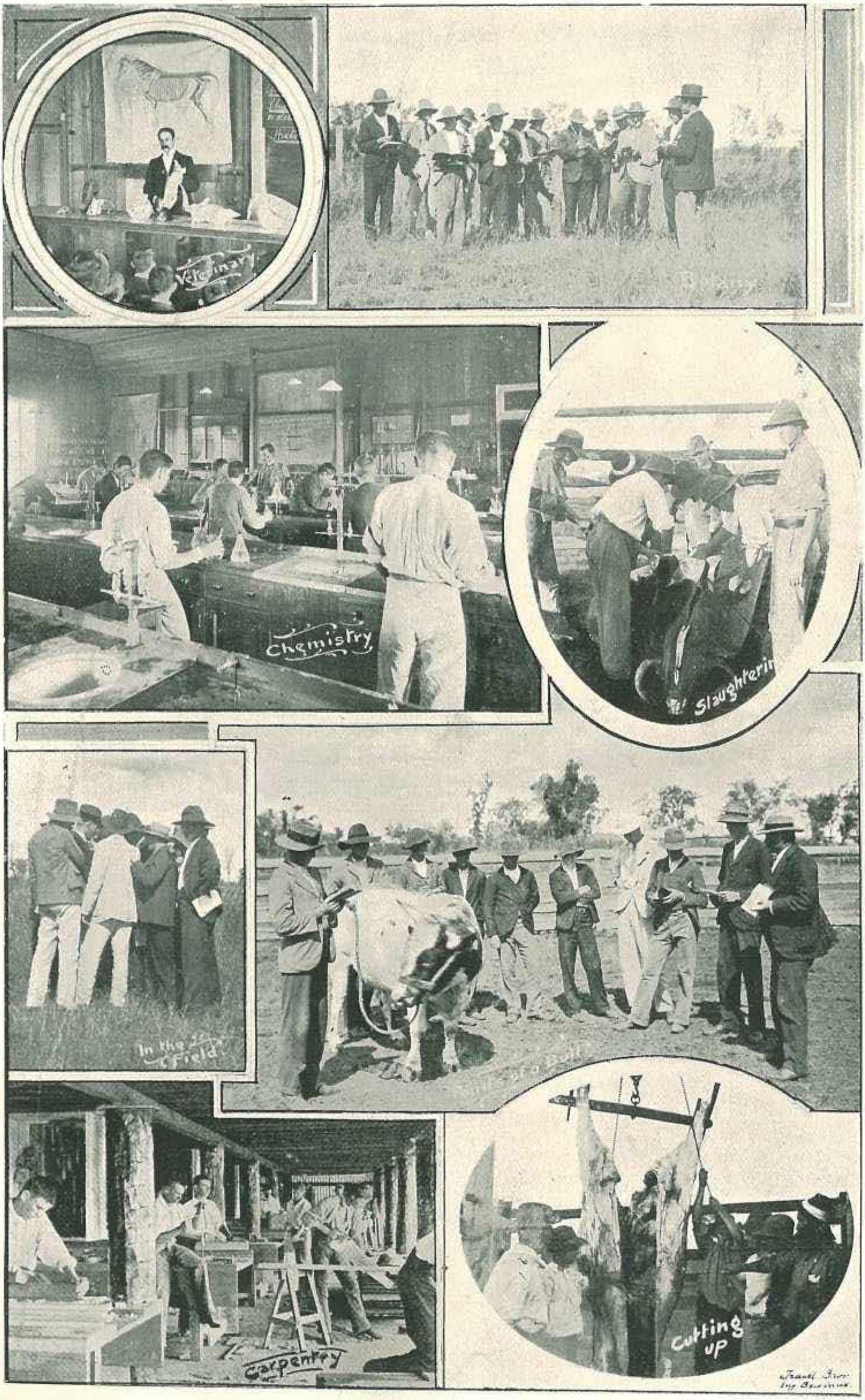
Mensuraion.—The course for this subject extends over two terms. During the first, students are taught to calculate the areas of regular and irregular figures by means of measurement only, and the method of keeping field notes. Two and a-half hours per week are given to this subject, and good progress has been made. During the second term, students are taught to use angles (computed without instruments) as a factor in the calculation of areas; also, the computation of the volumes of solids; average time, three hours per week.

Surveying.—This work is taken during twelve months. In the first term, three and a-half hours per week are allotted to this subject; in the second, two and a-half hours. Students are taught the use of the theodolite and level, and the simpler calculations arising from data obtained by means of these instruments. Much interest has been taken by students in this branch of the work.

Bookkeeping.—This subject is taught throughout two terms; average time, two and a-quarter hours per week for each class. In this work, students have been taught a simple system of bookkeeping suitable for a farm. No attempt has been made to give instruction in the more complicated methods in use in large commercial institutions. Reference is frequently made to the College books as a practical instance of a system likely to be of use to a farmer. Very good work has been done, and this is a most popular subject.

Chemistry.—This subject receives more attention in the class-room than any other taught at the College. An average of eleven and a-quarter hours, out of a total of twenty-seven and a-half hours per week of class work, is devoted to chemistry. At the same time I wish it to be clearly understood that, while we aim to turn out young men possessed of a good knowledge of the chemistry of the soil, and the products they may be called upon to produce therefrom, also to enable them to take a leading part in advanced agriculture, we do not pretend in the slightest degree

Plate XXIII.



The Laboratory—Carpenter's Shop—Veterinary and Botanical Instruction.

to turn out men fully equipped with a knowledge sufficient to enable them to follow the calling of an agricultural chemist. The principal matters dealt with in connection with this subject are soils, water, manures, fodder plants, grains, milk, butter, and cheese. The chemist, Mr. Gurney, reports as follows:—"During the first term of the year the preparatory class received instruction in elementary scientific principles which were explained and illustrated for their benefit. This included an explanation of the common properties of matter, thermometer, barometer, common and air pumps, syphon, of specific gravity, centre of gravity, &c. The value of this preparatory work is evidenced by the better results obtained in the work of the next term by students who have passed through it. In the second term the class is taught theoretical chemistry, in which they study some of the general principles of chemistry and the properties and reactions of some of the typical elements and their compounds. The second and third year classes are taught the mechanical and chemical conditions of soils, the classification and composition of manures, the plant food requirements of the different crops, the composition and functions of the different constituents of fodders, properties of flour, &c. In practical chemistry, study was made of the reactions and qualitative determinations of bases and acids commonly occurring in agricultural products. The quantitive work comprised the gravimetric determination of the ingredients of simple salts, the analysis of manures, milk, &c. In all this work particular importance was attached to the principles which had a direct bearing upon the farm work of the students. It may be said that the conduct of the students in the class-room was exceptionally good, and it may be said that the progress of the classes upon the whole is thought to be satisfactory, but, owing to the very diverse educational training of the students who enter the College, the general advance in chemical knowledge has been somewhat slower than in Universities and institutions where the classes are composed of young men of higher educational attainments." In addition to College work, Mr. Gurney performed the following analytical work for your Department:—Guano (five samples); soils (five samples); water (six samples). Samples of flour from various milling companies of Brisbane were also procured for the purpose of analysis, with the view of illustrating to students the quality of the flour from the various samples. Of the five samples analysed, the colour ranged from very good to excellent, the strength was up to that of flour from the southern States, but the gluten was somewhat low. Our farm soils were also analysed.

Botany.—A great deal of interest has been taken in the practical teaching of this subject, and also in the theoretical work, especially by those of the students who are enabled to grasp the technicalities. It may be seen from Mr. Bailey's report that he is working on the right lines to show good results from his teachings, because of his demonstrations in the field and his selection of plants with which to demonstrate his lectures in the class-room. Mr. Bailey reports as follows:—"I have paid weekly visits to the College and lectured on botany, and, from the attention the students have given to the subject, I am led to believe that the knowledge they have gained regarding plant life will be of service to them in their future work on the land. Seeing that it would be out of the question for a student, with the time at his disposal, to gain more than a moderate knowledge of the subject, I have confined my teaching to what will be of practical use to him. By reference to the examination papers, it will be seen that the results on the whole have been satisfactory."

Veterinary Science.—The practical branch of this work is very popular, and much attention has been given to the practical demonstrations given by the teacher, whereas the theoretical or class work does not receive the attention or appreciation that it deserves. The practical work is devoted principally to the preparation of drugs, blisters, drenches, ointment for wounds, and also, when animals are slaughtered on the place, demonstrations are given on the anatomy of the carcass, including cases where diseases were to be found. Class work has been confined chiefly to the anatomy of the human being and various animals. The castration of animals, and instruction in the methods of doing so, are carried out by myself or by some person deputed by me to carry out the work.

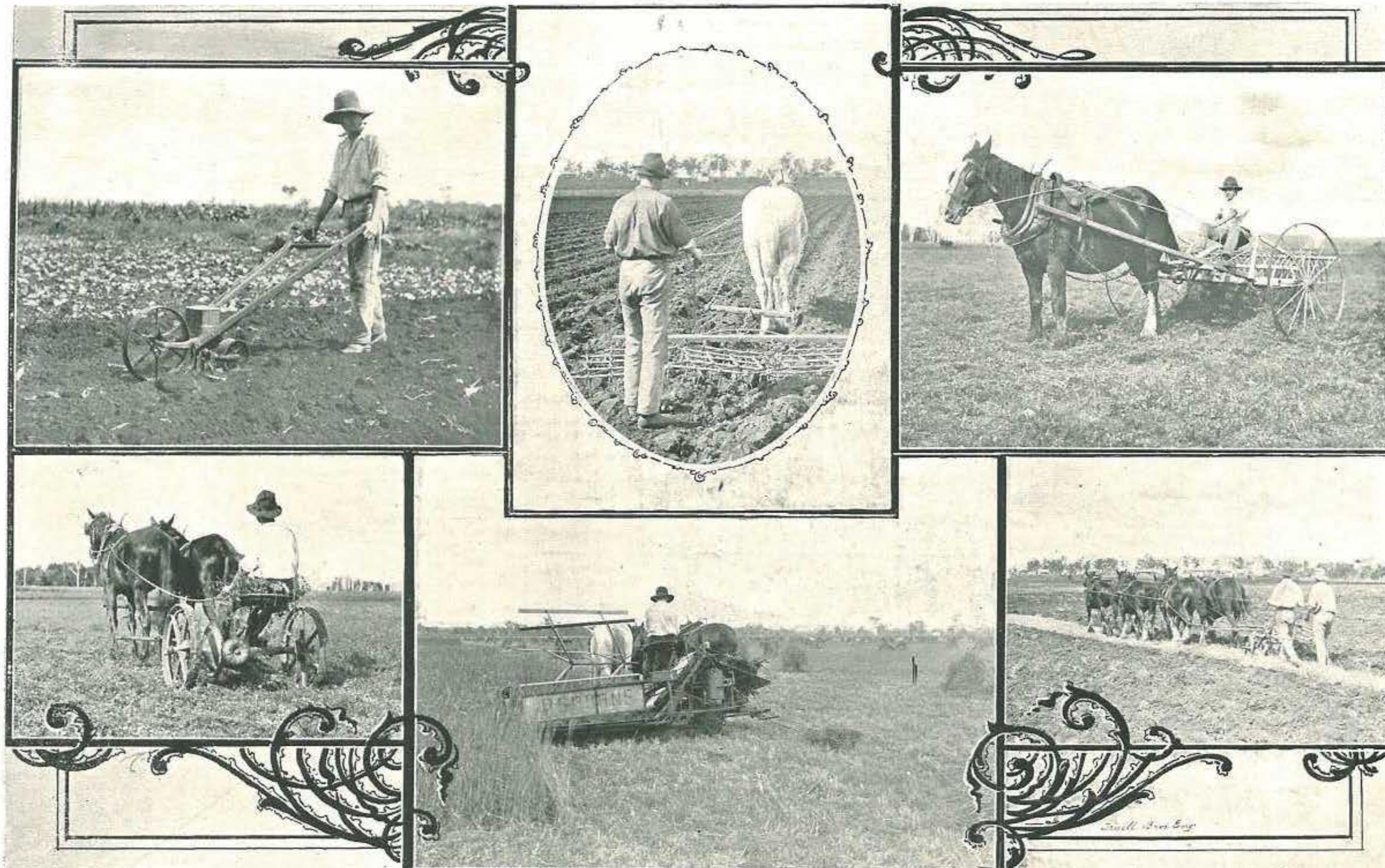
Mechanics.—Besides the permanent officers, a blacksmith and a carpenter, Mr. Quinn, of the Public Works Department, lectures and gives demonstrations on this important subject. His work in this respect is much appreciated, and excellent progress has been made all round. Mr. Quinn's method of teaching commands the greatest attention, both in the class-room and where practical lectures are given amongst the machinery, &c. Students take much interest in mechanical work in all its branches, and I am quite safe in stating that 60 per cent. of them are quite competent to take charge of engines, boilers, steam pumps, &c., up to 12-h.p. The following is the report of the work performed by Mr. Quinn for the year:—"During the first term the class numbered 20, and the time was devoted to the study of architectural drawing and building construction. These subjects being entirely new to the students, and requiring very close application and facility in the manipulation of mathematical instruments, rapid progress was not made, but, considering the initial difficulties, satisfactory results were attained. During the second term the class increased to 28, and the time was devoted to mechanical engineering, with special regard to the students being prepared to pass the examination for 'Boiler Attendants' Certificates' under the Shops and Factories Act. Although it was late in the term when the class commenced work, the enthusiasm displayed by the students and the close attention given to lectures and demonstrations enabled them to make excellent progress, and, in the test examination at the end of May, 24 students passed out of the 26 who sat for examination."

ENCOURAGEMENT TO STUDENTS DEFICIENT IN EDUCATIONAL ATTAINMENTS.—I may mention that here every encouragement and help is given to those students who may be found backward, through want of previous education, in all class work; but if, after six months' probation, they are found to be unable to cope with the scientific work, they are either requested to withdraw from the College, or take up practical work only, at the same time attending all lectures in connection with agriculture, dairying, the breeding and feeding of animals. I have no doubt that many of these lads will make successful practical farmers, and they should be encouraged as much as possible, especially when they in no way detract from the success of the more learned lads in acquiring the full benefit of the knowledge imparted.

FARM.—As mentioned in the earlier part of this Report, the drought detracted considerably from all-round progress. Experimental crops were almost a complete failure, but, notwithstanding the dry time in the earlier part of the year, a great deal of useful educational work was carried out. An area of 60 acres was cleared of its timber, ploughed twice, and planted with maize, wheat, oats, amber cane, sorghum, and potatoes; 73 chains of fencing were erected; 70 chains of drain were made in the fields adjoining the Tarampa road; 51 acres were subsoiled to a depth of 15 inches, preparatory to planting lucerne and root crops. Barnyard manure: 120 tons was applied to the land on which root crops are now growing. Road-making, and the clearing of pasture land of stumps and fallen trees, were resorted to. Students, in their turn, took part in all the above work, and it may be said that the knowledge acquired in this respect will be of great benefit to those who may happen to select land where clearing, fencing, subsoiling, road-making, &c., are necessary. Space will not permit of my dealing with each crop separately, but the following is a correct list of the crops planted, harvested, and the yield from same:—

CROPS STANDING AND IN GROUND, 30TH JUNE, 1902.

	A.	R.	P.		A.	R.	P.
Orchard	5	1	21				
Vineyard	2	2	17				
Vegetables	5	0	18				
Paspalum dilatatum	8	3	17				
Lucerne	94	2	9	... failed ...	24	1	7
Potatoes	5	0	0				
Wheat	9	0	31	... failed.			
Barley	40	1	17	... failed.			
Oats	29	2	32	... failed.			
Cowpea	5	0	0				
Kafir corn	5	0	0				
Rye	5	0	0	... failed.			
Under crop ...	215	3	2				
Fallow	101	3	30				
Total area cultivated	316	2	32				



Crops Removed, July, 1902—June, 1903.

Section.		A.	R.	P.	Yield.
1.	Cowpea—farm paddock ...	5	0	0	Ensilage 2 tons
4.	Potatoes	5	0	0	2 tons
8.	Kafir corn	5	0	0	Green fodder, 44 tons
9.	Maize	5	0	0	Ensilage, 17 tons
3.	Maize	5	0	0	20 bushels
4.	Maize	5	0	0	45 bushels
5.	Maize	5	0	0	Ensilage, 23 tons 18 cwt.
6.	Maize	5	0	0	Dry cornstalks, 7 tons 3 cwt.
12.	Maize	8	3	17	Ensilage, 31¼ tons
2.	Maize and pumpkins ...	5	0	0	Ensilage, 17 tons Pumpkins, 10¼ tons
7.	Maize and pumpkins ...	5	0	0	Green maize, 19½ tons Pumpkins, 5½ tons
1.	Cowpea (second crop) ...	5	0	0	Hay, 7½ tons
2.	(Creek paddock) panicum	17	1	6	Hay, 47 tons 2 cwt.
1.	(Calf paddock) panicum ...	4	3	22	Hay, 7 tons 15 cwt.
7.	(Garden paddock) panicum	1	0	3	Hay, 2 tons 7 cwt.
1.	(Sheep paddock) panicum ...	10	0	0	Destroyed by rain
10.	(Farm paddock) broom millet	2	4	0	
	Total	100	0	8	

Crops Failed, July, 1902—June, 1903.

	A.	R.	P.
Wheat	9	0	31
Barley	40	1	17
Oats	29	2	32
Rye	5	0	0
Lucerne	24	1	7
Maize	10	0	0
Potatoes	1	0	0
Total	119	2	7

Crops on Farm, 30th June, 1903.

Farm Paddock.

Section.	A.	R.	P.	
1.	5	0	0	Experimental: Wheat, 1½ acres; Rye, 3½ acres.
2.	5	0	0	Fallow.
3.	5	0	0	Pumpkins.
4.	5	0	0	"
5.	5	0	0	Fallow.
6.	5	0	0	Carrots, 3 acres; Mangolds, 1½ acres; Swedes, ½ acre.
7.	5	0	0	Fallow.
8.	5	0	0	Kafir Corn.
9.	5	0	0	Mangolds, 2¼ acres; Swedes, 2¼ acres; Carrots, ½ acre.
10.	5	0	0	Fallow, 2½ acres; Sorghum, 1 acre.
	3	0	0	Amber Cane, ¾ acre; Kafir Corn, ¾ acre.
11.	13	1	30	Lucerne.
11a.	2	0	0	
12.	3	3	17	Cape Barley.
13.	39	2	13	Lucerne.
14.	1	2	21	Experimental plots.
15.	0	0	23	*Paspalum dilatatum.*
	115	2	24	

Creek Paddock, No. 1.

	A.	R.	P.	
	38	2	26	Malting Barley, 15 acres; Baltic Wheat, 12 acres 2 roods; Oats, 9 acres; Fallow, 3 acres 26 perches.

Creek Paddock, No. 2.

Section.	A.	R.	P.	
1.	12	0	34	Lucerne.
2.	17	1	6	Lucerne and Wheat (mixed).
	29	2	0	

Creek Paddock, No. 3.

1.	3	1	6	Potatoes.
2.	14	0	0	Wheat.
3.	7	0	0	Oats.
4.	6	0	0	Fallow.
	30	1	6	

Bull Paddock.

1.	9	2	34	*Paspalum.*
2.	8	1	38	Fallow.
3.	17	2	0	Experimental Wheats.
	35	2	32	

Garden Paddock.

1.	1	2	31	Experimental plots.
2.	14	1	35	Lucerne.
3.	8	0	31	Fallow.
4.	0	2	17	Vineyard.
5.	2	3	11	Orchard.
6.	4	2	18	Vegetables.
7.	5	2	0	Fallow.
8.	1	0	3	Fallow.
	38	3	26	

Calf Paddock.

Section.	A.	R.	P.	
1.	0	2	0	Cocksfoot Grass.
2.	0	2	0	Rye Grass.
3.	7	3	30	Fallow.
	8	3	30	

Sheep Paddock.

1.	1	1	38	Field Peas.
2.	9	0	0	Oats.
3.	5	0	0	Cape Barley.
	15	1	38	

Gatton Paddock.

1.	23	0	0	Maize and Pumpkins.
2.	7	0	0	Amber Cane.
	30	0	0	

Cultivation on Hill.

1.	2	2	10	Orchard.
2.	2	0	0	Vineyard.
	4	2	10	

The following experimental and small plots have been planted in connection with the farm area:—

Sunflower
Cabbage—
  Cattle
  Golden Savoy
  Early Spring
  Large Vertus Savoy
  Etampes
  Drumhead Savoy
  Rock Red Pickling
Beans—
  Soja
  Canadian Wonder
Broccoli, Late White
Artichoke, Green Globe
Clover—
  Crimson
  English Red
  White
  Cow
  Bokhara
  Red
Guinea Grass
Flax
Cauliflower
Beet—
  Long Smooth Blood Red
  Covent Garden
Mangolds—
  Half Sugar
  Red Globe
  Giant Yellow
  Prize Long Red
Sorghum
Radish, Improved Long Chattiers
Carrots, English Shorthorn
Lettuce—
  Mixed
  California Cream Butter
Turnip—
  Extra Early Model
  Favourite
  Extra Early Milan
Kohl-rabi
Onions
Rib Grass
Perennial Rye Grass.

Experimental Wheats.

Baroota Wonder
Hamlyn's Prolific
Leather Head
Dart's Imperial
Marshall's No. 1
Early Para
Silver King
Carmichael
Fill Bag
Newmans
Australian Wonder
Steinwedel
White Tuscan
Smart's Early
Petatz's Surprise
Marshall's No. 3
Defiance
Gluyas
Unnamed (from Warwick).

SUMMARY OF CROPS, 30TH JUNE, 1903.

	A.	R.	P.		A.	R.	P.
Orchard	5	1	21	Kafir corn	5	3	0
Vineyard	2	2	17	Amber cane ...	7	3	0
Vegetables	4	2	18	Sorghum	1	0	0
Paspalum dilatatum	11	3	17	Carrots	3	2	0
Lucerne	79	2	32	Mangolds	4	1	0
Lucerne and wheat	17	1	6	Swedes	2	1	0
Wheat (experimental				Field peas	1	1	38
plots)	19	0	0	Cocksfoot grass ...	0	2	0
Wheat	25	2	0	Rye grass ...	0	2	0
Oats	25	0	0	Experimental plots	3	1	12
Cape barley ...	13	3	17				
Malting barley ...	15	0	0	Total area under crop	289	3	24
Rye	3	2	0				
Potatoes	3	1	6	Fallow	57	3	8
Maize and pumpkins	23	0	0				
Pumpkins	10	0	0	Total area cultivated	347	2	32

RAINFALL FOR YEAR.

1902.	Inches.	1903.	Inches.
July	·04	January	3·68
August	·64	February	3·81
September	·73	March	2·60
October	2·41	April	·79
November	3·72	May	7·55
December	5·14	June	·17

Total rainfall for year ... ... 31·28 inches.

A good system of bookkeeping has been adopted. The farm has been laid off into sections, each plot or section being named and numbered. A correct record is kept of the methods of cultivation, cost, crops produced, weight, &c. The produce supplied from one department to another is credited or debited, as the case may be. A reasonable sum is allowed for student labour which, together with the amount paid for hired labour, enables us to determine the exact cost of producing the various crops. Students are made acquainted with these facts, so that they may be in a position to say which crops are the most profitable, and also that which involves the greatest amount of labour to grow. The total area under cultivation is 347 acres, and three men are employed to do the work in connection therewith. It is thought that this area is too large for the hands available, but the object is to have many of the fields laid down with artificial grasses later on; this cannot successfully be done until the land has had a good preparation.

SEEDS.—All seeds are carefully tested, both for quality and germinating power, before planting, in order to enable us to determine what quantity is required.

PLANTING SEED.—Various methods of planting are adopted, with the seed drill, and broadcast, at various depths, and also different quantities of seed per acre.

ROTATION OF CROPS.—A system of rotation of crops is carried out as far as practicable. It is intended during the coming year to work on more defined lines in this connection.

MANURES.—The method of saving, preparing, and applying barnyard manures is carried out. The value of the different fertilisers, especially those best suited to the requirements of the different crops, receive attention.

DEEP CULTIVATION.—Deep cultivation, the methods, and the benefits to be derived therefrom, receive the best attention, both by means of practical demonstration in the field and lectures in the classroom.

DRAINAGE AND IRRIGATION.—The importance of the drainage, and the soils which require it, receive most serious consideration. An additional system of irrigation, on a small scale, has been established. Twenty-four acres of lucerne were irrigated during the dry weather, and with good results. The lines upon which I carried out this work have already been published in the *Agricultural Journal*, and therefore need no further comment. During the year two students, Baker and Fudge, competed in the youths' class at the Lockyer Agricultural Society's ploughing match, and, as usual, were successful in carrying off the first and second prizes respectively.

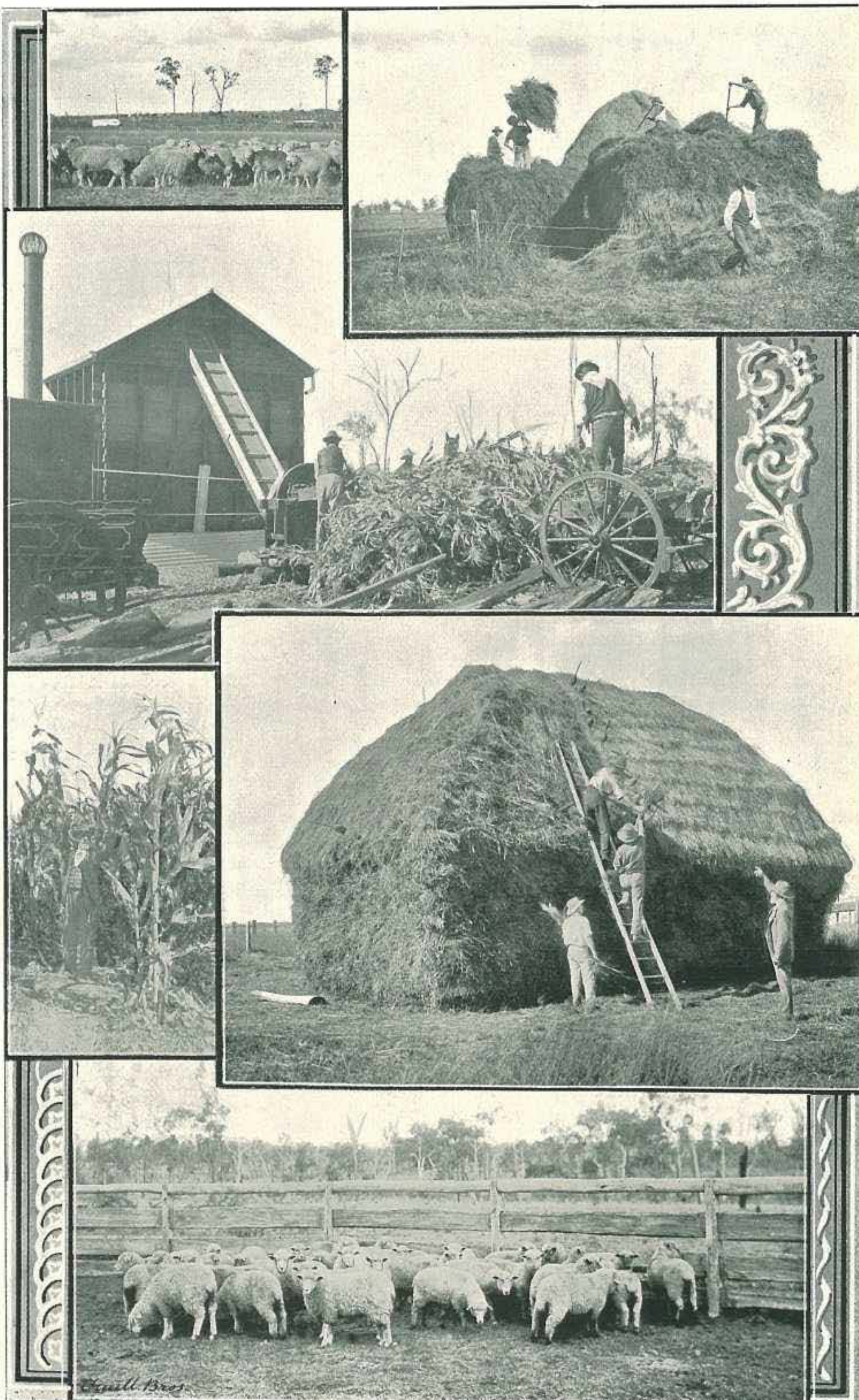
ANALYSIS OF SOILS FROM COLLEGE FARM.

	No. I.	No. II.	No. III.
Nature of soil	Loam	Loam	Loam
Reaction of soil	Neutral	Neutral	Neutral
	Per cent.	Per cent.	Per cent.
Capacity for water	49·6	46·9	50·8
Mechanical analysis—			
Root fibres	·10	·08	·05
Stones	·00	·00	·00
Coarse gravel	·00	·00	·00
Fine gravel	·10	·28	·08
Fine soil—			
Sand	35·30	36·51	36·05
Impalpable matter—chiefly clay	57·86	56·38	53·72
Organic matter ...	6·64	6·75	10·10
Moisture	6·146	5·091	7·359
Fertilising substances of fine soil, soluble in hot hydrochloric acid—			
Lime (CaO)	·991	·581	·783
Potash (K_2O)	·261	·242	·312
Phosphoric acid (P_2O_5)	·291	·346	·398
Nitrogen	·185	·185	·269
(equal to ammonia)	·224	·224	·326

The soils from which the above analyses were made are characteristic of the soils upon which the various crops were raised. Sample No. III. has had one crop of *Panicum* grown upon it, and may, therefore, be classed as soil almost in its virgin state.

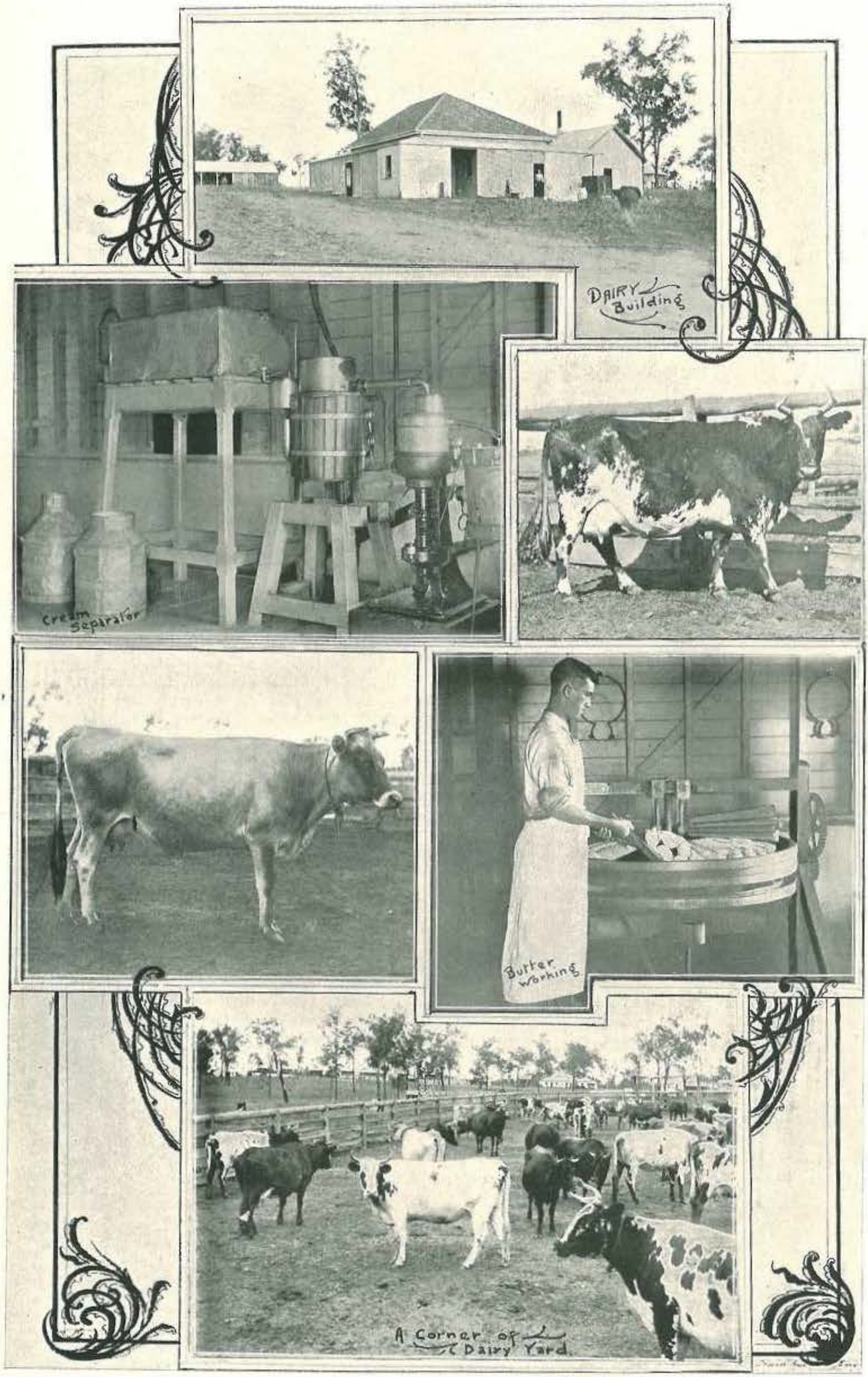
PREPARATION AND SAVING OF FODDER CROPS.—The value and methods of preserving fodder crops were practically demonstrated during the year. The crops most suitable for ensilage purposes, time and method of saving same, also corn stover and its preparation, were dealt with in a practical manner. Material was held over for the purpose of demonstrating to the farmers in a practical way the different methods of handling and saving fodder crops. The effects of the drought caused many people to travel long distances in search of information regarding this matter. Samples of prepared fodder were exhibited at the Toowoomba Show, and, I am led to believe from members of the association, commanded favourable criticism. The maize and sorghums, which are in the silos in the form of ensilage, have been tested and found to be in a perfect state of preservation. Experiments were made regarding the suitability or otherwise of bush grass for silage purposes, and, I regret to say, the experiment ended in disaster, inasmuch as the silo and the top portion of the ensilage were destroyed by fire, caused by spontaneous combustion. In dealing with this matter I wish to state, and without fear of contradiction, that no person, other than those who have had practical experience in dealing with the grasses which were available for use here, can form even the remotest idea of their suitability for silage purposes. These grasses, when they reach the stage at which they can be cut down with the mowing machine—namely, the seeding or flowering stage—are, because of their want of succulence, of but little value for pasturage purposes. They may, however, be saved as bush-grass hay, which I consider a good standby in time of droughts, but, owing to their want of moisture, when they reach the stage of growth above mentioned, they cannot be successfully converted into ensilage, unless mixed in small quantities with a fodder of a more succulent nature. This is proved by the fact that the grasses, *Andropogon Intermedius* and *A. Pertusus*, which were treated by us, contained at the flowering stage not more than 50 per cent. of moisture, whereas lucerne, maize, and other good silage crops contain at least 80 per cent. of moisture. The want of succulence in the grasses now referred to causes a want of pressure, with the result that greater fermentation and heat are evolved, which must bring about a fire-fanged material to such an extent that spontaneous combustion must in consequence occur. The above facts are fully proved by the conditions which existed during the burning of the silo here. The bottom part of the silage, which contained about half lucerne mixed with the grass, was as sound and palatable as on the day when it was placed in the silo, whereas that on the top, consisting of grass alone, was fire-fanged, and, where not actually burning in a flame, was quite hot enough to cause a blaze when brought into contact with dry material. Then, again, the great heat in the centre of the silo caused the surface stuff to become dry; this afterwards fell into the smouldering material and ignited. This statement is borne out by the fact that when the fire was first noticed by Mr. Watt, the farm foreman, a few minutes after it had taken place, the blaze was confined to the top of the silo within the building, and

Plate XXV.



FILLING THE SILOS—STACK BUILDING AND THATCHING.

Plate XXVI.



The Dairy.

immediately afterwards rapidly spread over the tarred timber of which the silo was constructed. I may further mention that there was no possible chance of any person entering the silo, unless by means of a ladder, and this was not procurable in the vicinity of the place. From this report inference may be drawn that the Principal knew that the material siloed was unsuitable for the purpose. In this respect I may state that, when filling the silo, I did express my doubts about it, but so much has been said of the value of Queensland grasses for ensilage purposes, that I was, I regret to say, induced to give them a trial. In concluding my remarks upon the subject, I wish to point out that the fire originated through spontaneous combustion, notwithstanding anything that may be said to the contrary. I have witnessed similar cases of fire that have occurred in lucerne stacks which consisted of badly saved hay.

GRASSES AND CLOVERS.—All grasses and clovers, with the exception of the Guinea grass which failed, are doing well. It has been found in the past that the rye grasses and clovers do not withstand the dry weather. Particulars of the different varieties now growing at the College may be found from the list of crops embodied in this report. The *Paspalum dilatatum* grass continues to grow well with us, and, notwithstanding the severe drought, it existed and responded in growth to the slightest shower of rain. I am now depasturing our dairy cattle upon it, by which means the seeds are carried and spread in the various fields, and small patches are now to be seen growing in all classes of soil. I find that this grass makes a first-class hay, and when chaffed is much relished by all animals kept on the place. Its value is now too well known to require further comment. During the year we distributed 129,040 roots, sent to all parts of the State, and for which we received £85 12s. 8d.; also, 156 lb. of seed for a sum of £11 5s. We have had no complaints about the roots, although parcels have been forwarded as far as Cooktown. The greatest care is exercised in selecting plants, so that no objectionable seeds or weeds may be distributed. All crops now growing on the farm are looking remarkably well and promise good yields. As regards the merits or demerits of the various wheats which are planted in acre plots, the time is inopportune to make any comment, but, so far, rapid growth has taken place. The same may be said about the oats, barley, and rye. As regards root crops, high yields from the early planting are assured. The methods of planting and cultivating all the above crops have appeared in the *Agricultural Journal* from time to time; no detailed report is therefore necessary. A crop of flax is, up to the present time, equal to anything that I have seen in countries where climatic conditions are considered more favourable.

In concluding my report on this branch of the College work, I wish to state that much credit is due to the farm foreman, Mr. Watt, and his assistant, Mr. Jordan, for the successful work that has been carried out. These gentlemen worked hard from daylight until dark, and used their utmost endeavours to bring about the successful results which may justly be claimed. Both report good progress from an educational point of view, and also good behaviour on the part of the students.

DAIRY WORK.—This branch of the College teaching has always been found to be most popular, and good progress has at all times been made, not only in the dairy and classroom, but also as regards the methods of breeding, feeding, and raising live stock. From a commercial point of view, the remuneration for the labour bestowed in carrying out the work has not been so great during the past year, this being attributable to the extreme dryness of the season. From an educational point of view, I consider that the good reputation gained has been fully maintained in every part of the work. Mr. McGrath, who presides over the dairy department, has worked hard in the interests of the students and the College generally, and I am pleased to be able to say that his work has met with considerable success. The practical work in the factory comprises the care and manipulation of milk, manufacture of butter and cheese, the methods of applying the acid test, working the machinery, including refrigerator, engine, boiler, and pumps. The practical work is backed up by lectures on the handling and manipulation of milk, by Mr. McGrath; and by myself on the lines on which stock should be judged, also the selection, breeding, and feeding of stock. Instruction is imparted in this connection in the fields amongst the herds, and in the classroom. Experimental work in feeding, with a view to ascertain the value of the various foods, was limited, owing to the scarcity of fodders. The use of prickly pear as a fodder in drought-stricken districts led to experiments being carried out here, and I must confess that the results were anything but satisfactory. The following are the particulars of the experiments :—Eight head of milk cows, at different periods of lactation, were chosen. The cows were fed on steamed oaten chaff for five days previous to the use of the prickly pear, and were allowed 40 lb. each of chaff per day. The chaff ration was gradually reduced, and prickly pear fed in its place. It was found advisable at first to feed but a small quantity of the pear, as the cows showed a disinclination to consume it, and also because of the scouring effect it had on the animals when fed liberally. During the second period of five days, 8 lb. of prickly pear, with 14 lb. of steamed oaten chaff, were fed daily night and morning. By gradually increasing the pear ration, it was found that a large quantity could be consumed at one time by the animals without causing any scouring. The pear was, previous to feeding, treated in the following manner:—It was singed on a quick fire to destroy the large thorns, and was then boiled from twelve to fifteen hours. After cooling sufficiently to allow of its being handled, it was run through a chaffcutter. Such treatment was considered advisable, as it was found that, while the small prickles were rendered harmless by boiling, the larger thorns found on the stalks remained hard and stiff enough to penetrate the tongue or jaw of an animal when chewing. Moreover, after boiling, if a well-matured leaf and a portion of the stalk be taken, and the pulp removed, the fibre which remains will be found to be tough and hard, and seemingly difficult to digest. When cut into small pieces, it could more readily pass through the digestive organs of animals.

The following set of tables gives the amount of food consumed and results obtained, and are numbered from 1 to 5, each table covering a period of five days:—

TABLE I.

Cow, No.	Period of Duration.	Food Consumed.		Milk Yield.	Per cent. Butter Fat.	Butter Fat.	Commercial Butter.
		Prickly Pear.	Chaff, Oaten.				
			lb.	lb.		lb.	lb.
1	5 days	...	200	56	3·6	2·016	2·257
2	5 ,,	...	195	64	3·8	2·432	2·723
3	5 ,,	...	200	62	4·0	2·480	2·777
4	5 ,,	...	200	58	3·8	2·204	2·468
5	5 ,,	...	190	72	3·6	2·592	2·903
6	5 ,,	...	200	84	3·4	2·856	3·198
7	5 ,,	...	200	66	3·7	2·442	2·735
8	5 ,,	...	200	97	3·5	3·395	3·802
		...	1,585	559	...	20·417	22·863

TABLE II.

Cow, No.	Period of Experiment.	Food Consumed.		Milk Yield.	Per cent. Butter Fat.	Butter Fat.	Commercial Butter.
		Prickly Pear.	Chaff, Oaten.				
		lb.	lb.	lb.		lb.	lb.
1	5 days	80	140	56	3·7	2·072	2·320
2	5 ,,	80	140	66	3·6	2·376	2·661
3	5 ,,	76	140	61	3·8	2·318	2·596
4	5 ,,	80	140	55·5	4·0	2·220	2·486
5	5 ,,	60	130	69	3·4	2·346	2·627
6	5 ,,	80	125	85	3·3	2·805	3·141
7	5 ,,	62	140	62	3·9	2·418	2·708
8	5 ,,	80	140	95	3·3	3·135	3·511
		598	1,095	549·5	..	19·690	21·050

TABLE III.

Cow, No.	Period of Experiment.	Food Consumed.		Milk Yield.	Per cent. Butter Fat.	Butter Fat.	Commercial Butter.
		Prickly Pear.	Chaff, Oaten.				
		lb.	lb.	lb.		lb.	lb.
1	5 days	100	120	54	3·5	1·890	2·116
2	5 ,,	100	120	64	3·6	2·304	2·580
3	5 ,,	100	120	58	3·8	2·204	2·468
4	5 ,,	100	120	54	3·8	2·052	2·298
5	5 ,,	100	120	63·5	3·3	2·095	2·346
6	5 ,,	100	120	84	3·0	2·520	2·822
7	5 ,,	100	120	60	3·6	2·160	2·419
8	5 ,,	100	120	91·5	3·5	3·202	3·586
		800	960	529	...	18·427	20·635

TABLE IV.

Cow, No.	Period of Experiments.	Food Consumed.		Milk Yield.	Per cent. Butter Fat.	Butter Fat.	Commercial Butter.
		Prickly Pear.	Chaff, Oaten.				
		lb.	lb.	lb.		lb.	lb.
1	5 days	160	60	53	3·6	1·908	2·136
2	5 ,,	160	60	60·5	3·7	2·238	2·507
3	5 ,,	160	55	56	4·0	2·240	2·508
4	5 ,,	160	60	51·5	3·7	1·905	2·134
5	5 ,,	160	60	60	3·4	2·040	2·284
6	5 ,,	160	60	81	3·1	2·511	2·812
7	5 ,,	160	60	58·5	3·6	2·106	2·358
8	5 ,,	160	60	90	3·4	3·060	3·427
		1,280	475	510·5	...	18·008	20·166

TABLE V.

Cow, No.	Period of Experiment.	Food Consumed.		Milk Yield.	Per cent. Butter Fat.	Butter Fat.	Commercial. Butter.
		Prickly Pear.	Chaff, Oaten.				
				lb.		lb.	lb.
1	5 days	220	...	51	3·5	1·785	1·999
2	5 ,,	220	...	59	3·7	2·183	2·449
3	5 ,,	220	...	55	4·1	2·255	2·525
4	5 ,,	220	...	53	3·8	2·014	2·255
5	5 ,,	205	...	51	3·3	1·683	1·884
6	5 ,,	220	...	78·5	3·0	2·355	2·637
7	5 ,,	220	...	57	3·5	1·995	2·234
8	5 ,,	220	...	87	3·4	2·958	3·313
		1,745	...	491·5	...	17·228	19·296

TABLE VI.

Cow, No.	Period of Experiment.	Food Consumed.		Milk Yield.	Per cent. Butter Fat.	Butter Fat.	Commercial Buttter.
		Prickly Pear.	Chaff, Oaten.				
		lb.		lb.		lb.	b.
1	5 days	305	...	52·5	3·5	1·837	2·058
2	5 ,,	335	...	58	3·8	2·204	2·468
3	5 ,,	343	...	57	3·9	2·223	2·489
4	5 ,,	330	...	51·5	3·7	1·905	2·134
5	5 ,,	350	...	50	3·7	1·850	2·072
6	5 ,,	320	...	77	3·3	2·541	2·845
7	5 ,,	350	...	60	3·5	2·100	2·352
8	5 ,,	350	...	89	3·3	2·937	3·289
		2,683	...	495·0	...	17·597	19·707

It appears from a perusal of the above tables that the milk yield fell off as the prickly pear replaced the oaten chaff.

Table I. shows the highest return, and Tables II., III., and IV. disclose a gradual diminution in the yield. Table V. records the lowest yield, 491·5 lb. of milk for a consumption of 1,745 lb. of prickly pear, while Table VI. shows a slightly increased yield over Table V., namely, 495 lb. of milk for a consumption of 2,683 lb. of pear. Comparing results, as shown in Tables I. and VI., it is found that 1,586 lb. of oaten chaff were consumed for a return of 559 lb. of milk, and 2,683 lb. of pear for a return of 495 lb. of milk, or in the proportion of 2·83 lb. of oaten chaff to every 1 lb. of milk, and 5·42 lb. of pear to every 1 lb. of milk.

The animals lost flesh when fed on the prickly pear alone. We do not look upon prickly pear as a milk-producing fodder, and it is unlikely that it will be used as a stock food if conditions other than severe drought prevail.

In conjunction with the breeding of pure stock, Jerseys, Ayrshires, Holsteins, Guernseys, and Shorthorns, several crosses were made with a view to arrive at some decision as to the crosses that are likely to be profitable as dairy animals, and, while admitting the difficulty of coming to any definite conclusion upon the lines of cross-breeding, the following figures will, at any rate, throw some light on the subject:—

WITCH—JERSEY SHORTHORN.

Month.	Milk.	Per cent. Butter Fat.	Butter.
	lb.		lb.
May	162	3·6	6·53
June	305	3·6	12·29
July	388	3·5	15·20
August	391	3·6	15·76
September...	387	3·6	15·60
October	368	3·5	14·42
November	421	3·6	16·97
December	463	3·7	19·18
January, 1903	538	4·1	24·70
February	424	4·0	18·99
March	484	4·2	22·77
April	429	3·5	16·82
May	163	4·0	7·30
	4,923	...	206·53

MONA—HOLSTEIN SHORTHORN.

Month.	Milk.	Per cent. Butter Fat.	Butter.
	lb.		lb.
June	454	4·0	20·33
July	488	3·7	20·22
August	501	3.6	20·20
September	444	3·8	18·89
October	384	3·7	15·96
November	566	3·8	24·08
December	743	3·6	29·95
January, 1903	699	3·6	28·18
February	554	3·7	22·95
March	665	3·8	28·30
April	564	4·0	25·27
May	179	4·4	8·82
	6,241	...	263·15

NIGHT—HOLSTEIN DEVON.

Month.	Milk.	Per cent. Butter Fat.	Butter.
	lb.		lb.
May	352	4·1	16·16
June	368	4·3	17·72
July	451	4·0	20·20
August	442	4·1	20·29
September	356	4·3	17·14
October	322	4·2	15·14
November	388	3·9	16·94
December	461	3·8	19·92
January, 1903	470	4·0	21·05
February	367	4·5	18·49
March	387	4·7	20·37
April	80	5·1	4·56
	4,444	...	207·98

JEANNIE—AYRSHIRE SHORTHORN.

Month.	Butter.	Per cent. Butter Fat.	Butter.
	lb.		lb.
October	536	3·6	21·61
November	731	3·5	28·65
December	605	3·6	24·39
January	599	3·5	23·48
February	617	3·8	26·25
March	532	3·4	20·25
April	390	4·4	19·21
May	310	4·2	14·58
June	340	3·3	12·50
July	204	3·8	8·68
August	103	4·0	4·61
	4,967	...	204·21

I may point out that the above returns were obtained during part of the time when we were suffering from the severe drought; they cannot, therefore, be taken as fair comparison as to the amount of butter the animals would yield under more favourable circumstances. So far as the constitution and general appearance of the cross-breeds are concerned, I am inclined to favour the Holstein crossed with any of the ordinary breeds, and, next, the Ayrshire. Experience, past and present, has led me to give a high position to the Ayrshire and Holstein for cross-breeding purposes, especially if the females with which they are mated are in any way delicate in constitution. It may also be claimed for these crosses that good bulky animals, in some degree suitable for butchering purposes, will be produced, especially when a good proportion of Shorthorn blood is kept in the herds. Animals that are considered unfit for crossing with any class of sire are culled and placed on the butcher's block.

The following is a list of the animals and respective breeds now at the College:—

Guernseys	1 stud bull	...	2 females
Holsteins	2 bulls	...	3 females
Jerseys	3 bulls	...	23 females
Ayrshires	12 bulls	...	43 females
South Coast	...	...	5 females
Shorthorns	5 bulls	...	35 females
Mixed	28 males	...	66 females
Total	51 males	...	137 females

Ten stud bulls were disposed of during the year for a sum of £98 9s. 9d. Services of stud bulls to farmers and others, 17; amount received, £5 15s.

Killing our Own Meat.—Mr. J. Meehan, the herdsman, has carried out his duties in a very diligent manner, and the matter of butchering has been added to his work. Having been for some years concerned in this business, he is competent to impart to the students a good knowledge of this work. A new refrigerating coil has been added to one of the cool rooms, so that we are now in a position to store our meat at a low temperature.

Radiator.—A steam radiator plant was erected at the College by Messrs. Brown, Webb, and Coe, and worked for a period of eight days. By the radiator method of butter-making, the milk is pasteurised at a temperature of 180 degrees F., and is cooled to a temperature of from 90 degrees to 98 degrees F. as it passes into the separator bowl. The cream, on separation, is cooled to churning temperature by a current of water of a temperature of from 40 degrees to 50 degrees F. which flows around the churning bowl. A record was kept of the quantity of milk treated, butter-fat test, and yield of commercial butter. The computed quantity of commercial butter was arrived at by allowing 12 per cent. for matter other than butter-fat in commercial butter. The plant worked smoothly. The product was a sweet, clean-flavoured butter; at the time of manufacture a pasteurised flavour and odour were distinctly perceptible. Stored for a period of three weeks, at a temperature of from 50 degrees to 60 degrees F., the butter was then found to have a clean flavour and good aroma. The butter granules were small. When working a radiator plant, it is necessary to have a good supply of cold water, and a refrigerator is indispensible. The skimming capabilities of the machine are good. The following table gives the quantity of milk treated, butter-fat reading of whole and separator milk, computed yield of commercial butter, also actual churn results. The butter was salted in the proportion of ¾-oz. to 1 lb. :—

Pounds of milk treated.	Whole milk, butter-fat reading, Babcock test.	Skim milk, butter-fat reading, Babcock test.	Butter yield, calculated from test, 12 per cent. added.	Actual churn yield.
			lb.	lb.
522	3·8	·025	22·216	23·00
580	3·8	·030	24·684	25·25
599	4·0	·033	26·835	27·50
592	3·7	·032	24·532	25·00
564	4·0	·030	25·267	26·00

I have no doubt that in the near future these machines will be found in use in large factories where plenty of steam and refrigerating power is available. Although the trial at the College was most satisfactory as far as the quality of the butter is concerned, I am not in a position to state definitely the results that would accrue from the use of a larger machine. The machine referred to as used in the trial here had a capacity of 30 lb. of butter per hour, and the amount of steampower required to work it was too great to allow of its being worked in small factories.

Experiments in Keeping Butter at High and Low Temperatures.—In order to ascertain the effects of high and low temperatures on stored butter, the following experiments were carried out :—One churning was divided into two lots, the product from which was pasteurised cream ripened with a prepared lactic acid ferment. The cream at the time of churning gave a butter-fat reading of 30 per cent. by Babcock tester, and the acidity of the cream was ·4, the churning temperature was 56 degrees F., salt was added at the rate of ½-oz. to every 1 lb. of butter. Lot 1 was stored at a temperature of 26 degrees to 30 degrees F., and Lot 2 at 35 degrees to 40 degrees F. Before placing in the storeroom, the two lots were tested and scored equally in flavour, 49 points from a maximum of 50. After a lapse of seven weeks, both packages were again examined. Lot 1.—The flavour and aroma were found to be equal to what they were when the butter was first placed in the storeroom; the texture was, however, not equal to No. 2. Lot 2.—The flavour and aroma had suffered slightly, while the texture was equal to when first stored. At this stage No. 1 was the better article by not more than one point. Both samples were then kept for a further period of ten days in temperatures varying from 45 degrees to 65 degrees F., and again tested, with the result that in the case of Lot 1 it was found that the flavour and aroma had gone off, and, in comparison with Lot 2, it had aged more during the ten days during which it had been submitted to the higher temperature, and at this stage both butters were equal in flavour and aroma, but Lot 2 was superior in texture.

This experiment was carefully carried out, but at the same time I am not justified in stating definitely, without further experiments, the results that are likely to accrue from the storage of butter at a temperature below freezing point, as compared with one of from 32 degrees to 35 degrees F., but I am prepared to say that frozen butter suffers more rapid deterioration when exposed to a high temperature than that which has been stored at 35 degrees F.

Experiments with Cheese Stored at Different Temperatures.—In the curing of Cheddar cheese, it is a matter of very great importance that certain temperatures be observed in order to obtain characteristic flavour and aroma. The temperature now observed is from 60 degrees to 65 degrees F. The effects of curing at higher temperatures than those stated are known from practical experience to produce an article inferior in keeping qualities, strong in flavour, poor in texture, and upon all points inferior to that cured at lower temperatures. Experiments have been carried out in order to ascertain the effects of low temperature in curing cheese. It may also be said that it is only within recent years that the refrigerator has found a place in our cheese factories, manufacturers were therefore unable to carry out experiments on any fixed lines. The results of experiments carried out here may be of some interest to cheese-makers. New Cheddar cheese from one vat of milk, made under the usual conditions, was divided into two lots, A and B. Lot A was cured at a temperature varying from 65 degrees to 70 degrees F., and Lot B was stored in a cool room at a temperature varying from 32 degrees to 40 degrees F. They were placed in their respective rooms after remaining four days in an open drying-room at a temperature of 60 degrees to 70 degrees F. At the expiration of nine weeks, the cheese was sampled and the lots compared. Lot A was found to be a cheese of very fair texture, and, considering its age, strong and sharp in flavour. Lot B was found to have a clean, mild flavour, mellow, and excellent in texture. The loss in weight during the period in which the cheese was stored was 1·5 less in favour of the low temperature. The texture, flavour, and general qualities of the cheese stored at the low temperature were better than those found in the cheese cured at the ordinary temperature.

The number of gallons of milk treated during the year amounted to 20,380¼, of which 3,579 were converted into cheese for a yield of 3,788 lb., and 13,021 gallons produced 5,597 lb. of butter; the balance, 3,780¾ gallons, was disposed of to the College dining-hall and residents of the place. The value of the dairy produce disposed of to the dining-hall, including beef, was £384 19s. 5d.; other than dining-hall, £119 12s. All produce is charged at market value. In addition to work actually carried out at the College, a splendid display of dairy produce, including bacon and hams, was made at the National Association's Annual Exhibition at Bowen Park in August last. A number of cattle from the College herd were shown at the Lockyer Show, and also in Toowoomba; these, needless to say, commanded much attention and appreciation. The matter of showing our live stock is considered to be of very great value to the dairy farmers, because they are thus able to see, at very little cost to themselves, stock typical of the various breeds. In considering my report on this department, I may say it must be admitted that the very best results have been, and are, accruing from the lines upon which this important work is being carried on. Students who have graduated through this branch of work are most successful, not only on their farms, but also as managers of factories and creameries. One of our students was successful in obtaining a position of manager in one of the largest butter factories in Victoria, where 30 hands are employed in the factory work alone. This student was selected from 45 applicants, and writes and thanks the College from which he received his diploma for the position he holds. Visitors from all parts compliment us for the cleanly manner in which every branch of the dairy work is carried out.

PIG-RAISING AND BACON-CURING.—This department has been financially the most successful in connection with our year's work. Apart from the financial gain, we have distributed pure-bred pigs, for breeding purposes, throughout all parts of the State, the demand having been far greater than the production. We have experimented with the various breeds and crosses, and find that the pure-bred Middle Yorkshire, or the Middle Yorkshire crossed with the Berkshire, to be the most profitable pig for the farmer, the pure Berkshire taking the second place. The students have received instruction in the breeding, feeding, and raising of pigs, together with bacon-curing in all its branches.

The following pigs were disposed of during the year :—

		Value.		
Pure Berkshires	81	£123	13	0
Pure Yorkshires	19	30	9	0
Pure Tamworths	7	10	2	0
Suckers	49	28	0	0
Baconers	13	32	2	6
Stores ...	5	6	7	0
Pork, bacon, and hams	...	5	9	1
		£236	2	7

Increase for the year—

Pure Berkshires	144
Pure Tamworths	30
Pure Yorkshires	45
	219

The herd kept at the College is considered by competent judges to be of a very high standard.

Prickly Pear as Pig Fodder.—Before feeding the prickly pear to the pigs, it was boiled for twelve to fifteen hours, and cut into pieces with a sharp spade. Swill from the dairy was fed with the pear. The classes of pig used for the experiment were matured breeding sows and weaner pigs (ten to twelve weeks old) of the Berkshire breed. The pear was eaten readily by the pigs. The mature pigs and weaners were fed as much pear as they would readily consume three times a day. It was found that the former class maintained a thin condition when fed on prickly pear and swill. The weaners did not thrive at all on the pear fodder; they lost flesh when placed on a full pear allowance, and at the end of a fortnight presented a starved appearance. It is evident that prickly pear is not a suitable fodder for growing pigs.

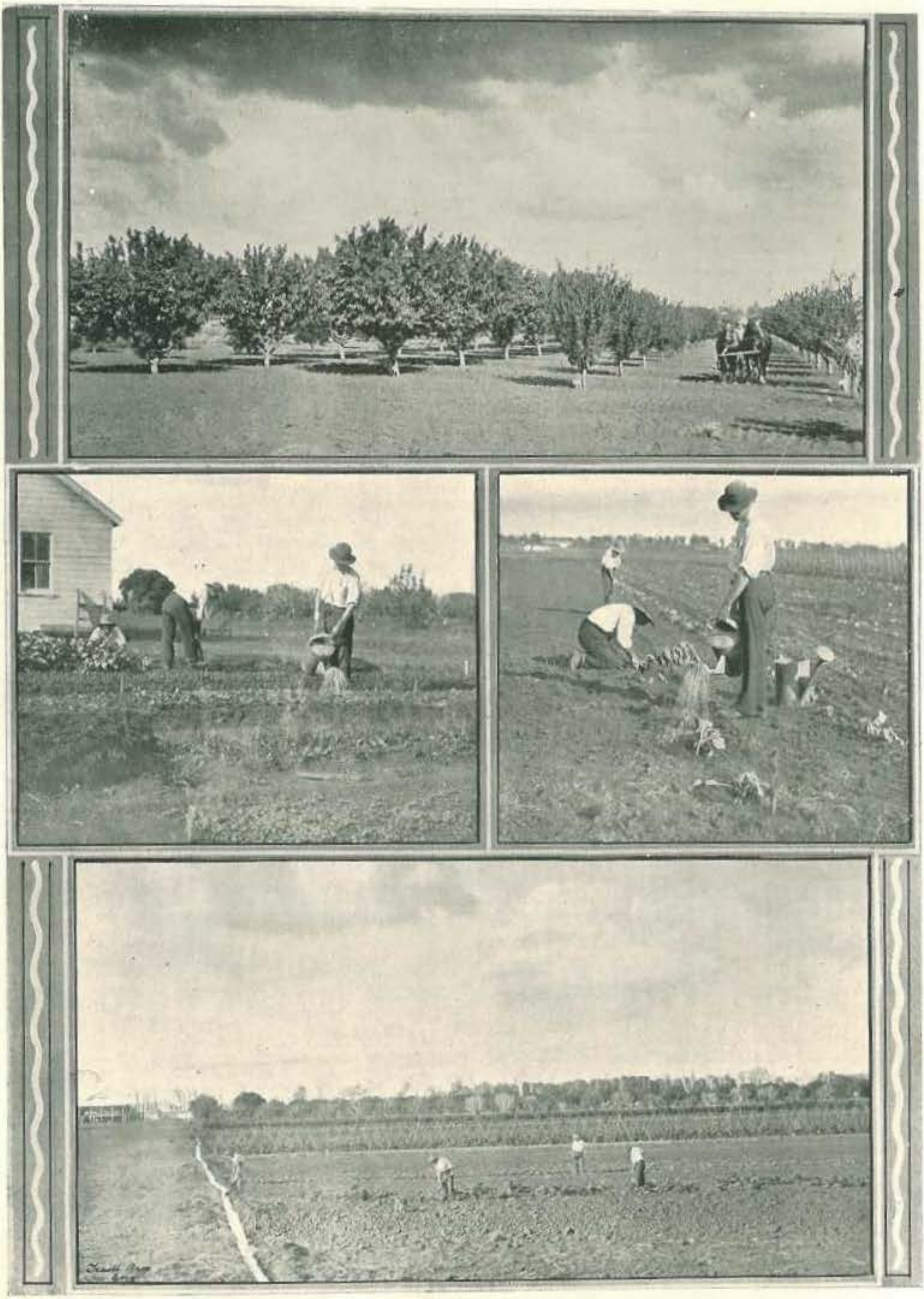
SHEEP-BREEDING.—We have been, for the past two years, experimenting with cross-breeding of sheep. The breeds selected were the merino (ewes), crossed with the Romney Marsh and Shropshire rams. The progeny from both crosses have been found to do remarkably well, and they are apparently well adapted for the country, climate, and the conditions under which they were raised. No especial care has been taken with regard to the pasture or land on which the sheep have been raised. The animals have been allowed to run on the pasture land in the near vicinity of the College buildings, having access to the low, damp, marshy land, which, during rainy weather, is swampy in places. Spear-grass, too, is found to make luxuriant growth in good seasons. The old merino ewes were found to suffer from foot-rot and from the effects of the spear-grass, while the cross-breds were not in any way affected. The sheep were at times put on the cultivation paddocks to eat down the weeds and overgrowth of grass, and for this purpose they may be classed as the "scavengers of the farms." Although much may be said in favour of both crosses the Shropshire ram crossed with the merino ewe certainly commands the highest merit. The progeny of the above cross are, to my mind, all that could be desired for mutton, either for home or local consumption. The Shropshire is an early maturing animal, a small food consumer, will live when other breeds would perish, and appears to have the power of transmitting its good qualities to its offspring. It may also be claimed that an infusion of blood from the quickly-maturing Shropshire will counteract the defects of the more slowly maturing merino. The mutton from this cross, though dark in colour, is hard, good in flavour and texture, and I consider it to be worth as much in our markets as that from the very best pure breeds. It may be said that we cannot go further than the first cross, because of the danger of the animals retrograding in quality; but, in my opinion, the contrary will be the result, provided that a thoroughbred sire be used, one that possesses the male qualities to the full extent, and will be, when used, prepotent and stamp himself on his progeny. Cross-bred ewes from the above, if crossed with the Southdown or Romney Marsh, and back again to the Shropshire, should produce a mutton animal of a high grade. Comparing the two crosses, as used here, I find that the Romney Marsh cross are not so strong and do not mature so quickly as the Shropshire. In crossing with heavy rams, maiden ewes should not be selected, on account of the difficulty in lambing and the great percentage of losses. Our flock is small in number, but sufficient for educational purposes.

POULTRY-RAISING.—The Instructor, Mr. W. Hindes, devoted the whole of his time to the poultry and bee departments, and reports good results, both from a practical and theoretical point of view. The breeding, cross-breeding, feeding, use of incubator, and caponising received careful attention, as also did bee-keeping. Laying competitions with the different breeds were resorted to, and the results published in the *Agricultural Journal*. The demand for pure-bred fowls was much greater than the supply. The returns from sales of poultry were £129 4s. 3d.; from bees, £22 15s.; total, £151 19s. 3d.

The following are the records of eggs laid during the six months ending 31st January. I may state that some of the fowls had not commenced to lay during the first month, so that their records will seem low in consequence. The fowls were not in any way forced or stimulated for a large egg-production. The records kept are from breeding pens only. They were fed on a plain diet—namely, pollard in the morning and wheat at night, with a little green food, such as cabbage-leaves or lucerne, at midday :—

—	Number of Hens.	Number of Eggs Laid.						Total 6 Months.
		Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	
Buff Orpingtons	5	80	80	75	75	80	75	465
White Leghorns	7	84	98	91	126	126	119	644
Brown Leghorns...	3	39	45	42	48	45	48	267
Black Orpingtons	4	44	48	64	68	60	60	344
White Wyandottes	6	84	78	72	96	90	84	504
Silver-laced Wyandottes	5	55	70	65	75	75	70	410
Plymouth Rocks...	2	12	30	28	34	32	28	164
Minorcas	3	18	30	42	54	51	48	243
Silver-grey Dorkings	5	30	85	70	75	65	60	385
Spanish	6	66	78	60	71	80	65	420
Langshans	3	15	33	36	45	39	39	207
O. E. Game	5	25	70	65	45	45	40	290
Light Brahmas	3	0	18	42	30	21	12	123

Plate XXVII.



The Orchard and Vegetable Gardens.

VEGETABLE GARDEN.—The work in this department was successfully carried out by Mr. G. Jackson, an ex-student. By the aid of a system of irrigation which was established some years ago, vegetables were available during the whole of the dry season. In this department a great deal of useful knowledge was acquired by the students in up-to-date methods of producing all sorts of vegetables, also methods of application of manures and those best adapted for the various crops. Mr. Jackson also delivered a number of lectures on the subject of gardening.

ORCHARD.—This branch of work is carried out under Mr. Voller, the Assistant Fruit Expert's directions. Mr. Voller visits the College when his attention is necessary, carries out the pruning, and also gives instruction to the students in all branches of fruit culture. It is needless for me to say that his teachings are highly appreciated. The yield of fruit was small, due, in the first place, to the drought, and, secondly, to a severe hailstorm which damaged the crop of peaches which were promising to yield well. Peaches and figs appear to do best here. The following is an extract from Mr. Voller's report on the year's work:—"During the greater part of the last twelve months conditions were dead against satisfactory work. Drought held supreme sway, and things had to stand back until rain came. It says something in favour of the soil and methods of cultivation when hardly a tree died, and the majority held their own surprisingly well. Very little growth took place until the first soaking rains came, but, thanks to the good condition of the land, when they came they took full effect, and a strong growth was the result. The young trees have all made fair progress, and some will be coming into fruit this season. A serious set back, in addition to the drought, was experienced in the shape of a heavy hailstorm, its effect being much bruising of bark and limbs, and destruction of buds. This damage is always most severe on young trees where each branch is of value in shaping the future tree, and buds are needed especially in arranging fresh growth. The present appearance of the trees points to a good yield for the coming season. During the year, and more particularly during last winter's pruning, a vigorous course of instruction was followed for the benefit of students in pruning and shaping, in summer pruning on the young trees, and fumigating and spraying. I wish to say that I was very pleased with the interest displayed by those who came under my tuition. A few of the students who went through the whole of the winter pruning gave me the greatest possible satisfaction in the way they took hold of the work and picked up its principles, and it was quite a pleasure to have them with me on the work. This also applies to the work of fumigation which I carried out." The vineyard work was carried on under the directions of Mr. Rainford, Viticulturist. The vines did not escape the effects of the drought, and, like most other crops, suffered severely, so much so that the yield of grapes from the vineyard near the Principal's house was nil. The vineyard on the Lockyer Creek carried a fair crop of grapes which, however, were partly destroyed by hail. Mr. Rainford carries out the work of pruning, spraying, and preparing the vines for the growth of crops, and also imparts to the students a practical knowledge of vine culture and all necessary work appertaining thereto. He reports that the students assigned to him gave strict attention to the instructions he imparted.

BLACKSMITHING.—Mr. A. Dennis, who is in charge of the smithy department, reports good, all-round progress in the work. Many students are competent to shoe horses, repair implements, wagons, and drays, and work up iron in a manner that would do credit to a tradesman. This branch of the work is much sought after by the students. Amongst the work performed may be mentioned horse-shoeing, general repairs to wagons, drays, and farm implements, care and attention given to engines, boilers, and steam pumps. A new cultivator and a potato plough were made, and the greater part of the ironwork for chaffcutter, also fitting up of same. All the smithy work which required attention was done on the place.

CARPENTRY.—This is one of the most instructive branches of the industrial work, and the desire to acquire a knowledge of handling tools is general amongst the students. Needless to say, every encouragement is given them to do so, for, at an institution similar to this, work of an educational nature is always available. The officer in charge of this branch, Mr. A. Jordan, takes a deep interest in the young men assigned to him for instruction, and, as far as the practical work is concerned, if they do not learn, the fault lies with themselves. The following comprise the principal works carried out during the year:—Erection of eight-stall stable, size 62 feet by 15 feet, chiefly from rough bush timber; engine-shed on Lockyer Creek; large log drain to carry off water from implement shed; lining silo; making and erecting gates; painting and overhauling wagons, drays, and farm implements; general repairs to College buildings.

Visitors.—We have a record of 1,064 persons having visited the College during the year. The majority of these were men interested in the production of products from the soil, and came for the purpose of acquiring knowledge to enable them to obtain better results from their labours. Apart from residents in our own State, we have had visitors from all parts of the globe; and I am sure it will be pleasing to all who have the welfare of the College at heart to know that the unanimous opinion of those competent to criticise, both at the College and abroad, was that the institution and its working were a credit to the State.

Correspondence.—During the time under review, 2,247 letters were sent from this office. Most of these were in reply to persons requesting information as regards the working of their respective callings, and the lines to follow to enable them to obtain better results. All letters received punctual attention.

Health of Students in Attendance.—The health all round has been exceptionally good, no sickness, with the exception of ailments of a trifling nature, having occurred. It is a fortunate and also a most singular thing that during the past five years no serious accidents have taken place. At an institution such as this, where there are so many horses, machines, and implements in the hands of learners and inexperienced persons, it is only reasonable to expect slight accidents at times.

Conduct of Students.—The conduct of students right through has been exceptionally good. Two monitors are appointed for each dormitory, and three for the dining-hall. These monitors are responsible to the Principal for the conduct of their fellow-students in the respective places over which they have been selected to preside.

Social Life.—Cricket, football, and tennis are the chief games played. We have two football clubs, two cricket clubs, and a tennis club. A 'bus and horses are available when the teams visit the different villages on Saturday afternoons for the purpose of playing matches. The annual soiree was held in the gymnasium at the end of the year, and was a marked success. I may point out that, while encouragement is given to the various clubs to take part in matches, these are confined to Saturday afternoons and public holidays, so that they in no way interfere with the duties which students are called on to perform.

In concluding this Report, I may say that I have dealt with the work in as brief a manner as possible; at the same time I have endeavoured to show that good and faithful work has been performed in every branch with which we have had to deal. From the movements of the ex-students it will be observed that we are on the right lines, and that our work is being directed in the right way. At any rate, those who ought to be the best judges—the men who send their sons here and pay for their education—are the very people who express their gratification at our work. I have no desire to claim all credit for the past work of the College, because the success is due to the loyal support I have received from the officers controlling the various departments, and also to the manner in which they have supported and assisted one another to bring about good results. My thanks are due to the visiting lecturers for their able assistance, and also to the College staff for their energy displayed during the year.

JOHN MAHON, Principal.

REPORT OF THE MANAGER OF THE STATE FARM, WESTBROOK.

Sir,—I have the honour to submit to you my Annual Report for the year ending 30th June, 1903.

Before giving any *résumé* of the work done for the year, it is necessary to state that the results of the previous autumn sowings of cereals, to which reference was made in my last report, were practically nil, owing to the unprecedented drought. Some of the blocks never even showed above ground, and the most that can be said of the best of them is, that they afforded a bite of greenstuff when it was most required. The drought was at its worst right up to October, when we got the first relief; but no real benefit was received until the January and February rains were upon us. All through the drought, however, we had abundance of sound dry fodder (sorghum, stover, cowpea hay, and straw) which was saved from the previous season.

The following table gives the rainfall for the year:—

	Inches.		Inches.
July	·06	January	4·21
August	·29	February	4·19
September	·38	March	1·54
October	3·20	April	·33
November	3·34	May	4·51
December	3·35	June	...
		Total ...	25·40

It is a little difficult for me, I find, to choose those parts which are in need of prime reference in this report for the information of the Minister, the department, and the public generally. The good work done on the farm, and also the interest taken in it, is apparent, from the increase in the numbers of visitors from all parts, which include not only farmers, but men of other callings. A considerable amount of my time has been devoted to showing these visitors round the crops, and all inquiries relating thereto have been cordially replied to, and all information relating to the industry has been given by letter when desired. It is gratifying to note how the farmers are adopting recommendations for their own advancement.

In addition to the above, practical lessons on budding and pruning orchard trees, pruning and training grape vines, and the method of collecting soils for analysis have been given to the boys of the State schools who were brought here on several occasions by Mr. Stevens, head teacher. This being supplementary to the theoretical lessons given in schools must be of immense benefit to lads on whom the future success of farming depends.

Owing to the nature of the season, early field cropping could not be successfully proceeded with; but advantage was taken of the weather to have about 25 acres of land subsoiled. The great value of this work has been clearly demonstrated, it being the only portion of the farm where any crops could be kept growing during the hot dry months.

MAIZE.—Reference was made in my last report to the experimental blocks of maize. I may here state that sixty applicants from all over the State were supplied with seed obtained from these blocks. This realised about £50. The same varieties, with the exception of Macleay River and Golden Superb, which were discarded (being hybridised), were planted again last October; the blocks being made a little narrower, and the divisions wider. This was done to minimise the danger from hybridising, and also to give sufficient room for growing one variety of pumpkins throughout the series. The varieties are as follow:—

Longfellow Dent	Sixty Day	Leaming
Japanese Ninety Day	Riley's Favourite	Early White Horse Tooth
Early Hogan	Golden Beauty	Hawkesbury Champion
Sydney Red Nibbed	Legal Tender	Mastodon
Balderman	Piasa Queen	

The grain has not yet been threshed out, but I anticipate the yield to be very much below the average; in the case of Sixty Day and Mastodon it is almost nil. Whatever seed we have will be carefully reserved for distribution.

MILLETS AND SORGHUMS.—Four acres of Kafir corn, sorghums, and maize were sown broadcast in September on the recently subsoiled lands. The seed responded to the first rains, and continued to grow until the flowering stage. It was cut with the horse mower, field-cured, and built in two stacks containing 14 tons of excellent fodder. A second crop followed, varying in height from 6 to 12 feet. This crop is now being cut as required for the working horses.

A plantation of the following varieties was sown in drills, 4 feet apart, for seed purposes:—

Planter's Friend (Imported)	Sorghum, Folger's Early
Amber Cane	White Kafir Corn
Early Orange Cane	Red Kafir Corn
Sorghum, Colier	Broom Millet

The Planter's Friend and White Kafir Corn produced the most seed and the heaviest weight of fodder.

After the seed was gathered the crop was cut into sheaves by the corn harvester, and afterwards built into large weather protected stooks. There was also a trial plot of *Penicillaria* which came to me as a new plant, but I recognised it as Soudanese Millet. It is a good subject for dry hot country, giving an amazing amount of green feed, but the seed is of little value for stock.

PANICUM.—One and a-half acres of this plant were sown broadcast on land previously cropped with cowpeas, and yielded 4 tons of hay. A crop of 1½ acres sown much earlier, following rye, was very poor.

LEGUMES.—*Cowpea:* The varieties of this legume are without doubt amongst the most valuable crops a farmer can grow. Last season the seed was sold at 30s. per bushel in Toowoomba. The pulse may not only be fed to stock, but it is an excellent table vegetable. The vine makes the most nutritious of hay, is one of the best green manures, and is a luxuriant cropper. Four acres of black variety were drilled 3½ feet apart on subsoiled land for seed purposes. Although the season was very much against it, the rows overlapped one another, but the pulse did not ripen before the frost was on it. I estimate the weight of hay on the stack at about 2 tons. One bushel of seed was used to drill $1\frac{1}{2}$ acres of dry stony land, and when 12 inches high the horse mower was run over it, and it was ploughed in for green manure. The great objection to growing these crops is the expense and difficulty of handling them.

Tonga Bean.—Three rows aggregating 50 chains long were sown along the fences. The growth of this bean is amazing. Sheep and cattle browse on it voraciously. It ought to be a good forage crop for arid regions. The pods are a delicious vegetable cooked like French beans.

LUCERNE.—There being a limited area of suitable land available for this crop, we have only a 4-acre block, which was sown in March. This has done very well; one light cutting was taken off in May and fed to the horses.

The following legumes were sown in smaller areas at different seasons—viz., spring, summer, and autumn—but none of them podded well until the latter season:—

The following table gives the results of a block of dwarf beans put in for testing purposes—

Startles: Rather delicate in constitution; poor crop.

Governor Denison: Hardy and abundant cropper; did well.

Inexhaustible: Did fairly well.

Anderson's Wonder: Average crop; good quality.

Negro Longpod: Cropped well; should be pulled young.

Thorburn (Lima), Burpus (Lima): Beginning to crop heavily when the frost came.

Stringless Greenpod: The best of all; continuous bearer; lasts a long time; perfectly stringless; and splendid for table.

Runner Beans, King of the Garden (Lima), Duress Challenger (Lima): Beginning to crop when frost came.

Zebra, White Dutch, Mount D'Ore, Scarlet Runner: Succumbed to drought.

A quarter of an acre each of garden peas and broad beans sown last winter were an entire failure.

GRASSES.—*Paspalum dilatatum*: I am inclined to think this is the best of all the introduced grasses. It stands all weathers here, giving abundance of feed all the year round. The method I have adopted for laying down a piece of very stony land is as follows:—The land was cultivated as well as could be, and furrows drawn out the width of the wheat drill apart. Stools were dug from the old block, divided and dropped into furrow at intervals of 3 feet, and covered with the plough. Between the furrows Marshall's wheat and Nepaul barley were drilled in for green feed, and the Cambridge roller put over all. The two latter crops afforded any protection needed. When they are taken off, and the stubble ploughed in, I anticipate the self-sown seed from the *Paspalum*, which is now grown well, will cover the whole, thus producing a good sward next summer. A bed was also sown with Awnless Broom Grass received from the Hon. A. J. Thynne, M.L.C. It did very well up to seeding time, and then died off. The seed was saved for a further trial.

PUMPKINS.—A crop of Crown pumpkins grown on 2 acres of subsoiled land yielded 10 tons. This is one of the best-selected stocks, being the truest to name I ever had. As this spot is quite isolated, it will be valuable for seed purposes. About 15 tons of other table pumpkins were grown between the varieties of maize.

A trial was made of a new pumpkin procured from Messrs. Holmes and Co., seedsmen, Toowoomba, called "Silver Nugget." It is a small, silvery-white Crown-like variety, and the best of all for table use. This has also been kept isolated, and a very limited supply of seed will be available. The other varieties, grown with more or less satisfactory results, were as follow:—

Ironbark: Good crop, but not true.

Button: Very good.

Jonathan: Moderate crop, good fruits.

Premium: Abundant and early.

Victory: A few fruits only.

Mammoth: Good, but the crop mixed.

Turk's Cap: Fair.

Marrows and Squashes—

Charles Naudin: These three so-called varieties came to me from Italy, Victoria, and U.S.A. respectively. It is an enormous cropper. The fruit is handsomely marked pumpkins, shaped light with their flesh, and a delicious flavour.

Fordbrook: Did not do well.
Yellow Custard Bush: A fine crop.
White Custard Bush: A fine crop.
Long White Bush: A fine crop, splendid fruits.
Delicata: Delicious table variety, prettily marked.
Crookneck: More ornamental than useful.
Scarlet Sugar: Great cropper, sweet, but watery.
Chili: Very large bright red.
Hubbard: The best of all dry squashes.
Long Bush Marrow: Abundant crop, large fruits.
Warted Marrow: Abundant crop, large fruits.
Long Striped Marrow: Handsome fruit, good crop.
Rice Marrow: Good table variety, bears well.

WATER MELONS.—The following varieties were grown and every one did well (I still think for general purposes, market or home use, the two most satisfactory kinds to grow are "Cuban Queen" and Golio Early):—Sweet Home, Cuban Queen, Klickley, Sweets, Ironclad, Cole's Early, Santiago, and Ice Cream. Rock melons were represented by twelve varieties, and preserving melons by four. The fruits of these were not so large as in more favourable seasons, but the flavour was perfection. Amongst six varieties of cucumber an unnamed sort from Finland is particularly worthy of attention of those intending to grow for the pickle factories. It is small (never growing more than 4 inches long in the richest of land), smooth skin, very prolific in small, perfectly-shaped fruits—an ideal gherkin. All the above were grown in subsoiled land. They were never checked in growth after once making a fair start. On the 10th January a hailstorm gave them a considerable battering, which they soon recovered from, and consequently produced heavy crops. This is particularly the case with a plot of a quarter-acre of grammas.

COTTON.—Ten varieties were grown in ordinary land, but owing to the drought they never got a fair start. The plants were stunted, but in the autumn a few made an effort to produce bolls, and one here and there burst. The only two sorts producing a few decent bolls are "Jones Big Boll" and "Russel," both Uplands cotton. The frosts checked any chance of production in this experiment. Enough seed has been saved off most of the varieties for a further trial.

ROOTS.—An acre of subsoiled land was sown with Mammoth Long Red, Long Yellow, and Yellow Globe mangels in October. Germination was slow, several misses occurred, and the plants were stunted for a long time owing to dry weather. The crop is consequently thin, but the bulbs are of enormous dimensions. A quarter of an acre of carrots sown at the same time failed entirely. The same area was sown with Swedes in February, including Imperial Purple Top and Laing's Garden—a table variety. Both varieties are doing well, but have not attained their full size. Sowings of white turnips of the following kinds were made:—White Model, Red American, Orange Jelly, and Greentop Aberdeen. The three first are the most suitable for table use, but for stock-feeding purposes the latter is far away the best, producing very large roots. Kohl-rabi and Ruta Baga is also grown, and four varieties of onions.

CABBAGE, CAULIFLOWER, &c.—About two acres are under these crops. Transplanting began in March, and was continued in favourable weather until May. The cabbage plot contains the following varieties:—

Winstadt: Cone-shaped, very solid, splendid table.
Succession: Can't be beaten for general crop.
Autumn King: Gigantic cabbages, a late kind.
Danish Roundhead: A fine large head, good market sort.
Ballhead: One of the handsomest large cabbages in existence.
Early Stonehead: Early, solid, medium sized.
Late Stonehead: Late, solid, medium sized.
Sunhead: Good market sort, always bears well.
Danish Green Glazed: Peculiar variety, small heart.

The varieties of cauliflower most in favour so far are White Queen—a beautiful white medium-sized head, and very early. This variety is in full season during May and June. Carter's dwarf Mammoth is just beginning to head. This is a splendid collection. The fine even growth of magnificent heads, with no insect pests to damage the leaves and with no weeds on the plot, affords a perfect picture. The same can be said of Savoys, Red Cabbage, Brussels Sprouts, and Curled Kale.

The marketing of the above began the first week in June, and are realising from 4s. to 7s. 6d. per dozen.

CEREALS.—The season for sowing these has been very favourable. The land being in excellent tilth and plenty of moisture available, the plant came right away, except in the last two sections. These two were sown later and in soil much drier, consequently the plant is more tedious in making its appearance. The following table gives the names, areas of sections, time of sowing, &c., of the different cereals. The wheats, excepting No. 21, are representative of the varieties imported by the Department of Agriculture for distribution amongst the farmers of the State:—

No. of Section.	Name.	Area of Section. Acres.	When Sown.	Appearance at Date.
1.	Marshall's No. 1 ...	1¾	25 April	Tillering strong
2.	Baltic Red ...	1¾	"	"
3.	Petatz Surprise ...	1¾	"	"
4.	Baroota Wonder ...	1¾	"	Strong, upright, tallest
5.	Dart's Imperial ...	1¾	"	Tillering strong
6.	Carmichel ...	1¾	3 May	Beginning to cover ground
7.	Leatherhead ...	1¾	"	Good plant
8.	Australian Wonder ...	1¾	"	"
9.	Silver King ...	1¾	"	Rather weak, crop thin
10.	Defiance ...	1¾	"	Rather weak, crop very thin
11.	Steinwedel ...	1¾	14 May	Good plant
12.	Fillbag ...	1¾	"	"
13.	Hamblyn's Prolific ...	1¾	"	Beginning to cover
14.	Bobs ...	0¾	"	Good plant
15.	White Tuscan ...	1	"	"
16.	Gluyas ...	1	15 May	"
17.	Warwick ...	1	"	"
18.	Early Para ...	1	"	"
19.	Newman's Early ...	1	"	Rather weak
20.	Smart's Early ...	1	"	Beginning to cover
21.	Marshall's No. 3 ...	4½	16 May	Fair to good
22.	Federation ...	0⅝	"	Good
23.	Budd's Early ...	4	9 June	Showing through
24.	Allora Spring ...	4	11 June	"

Further trials of crossbred wheats are being made, 60 drills being marked out 1 chain long, 2 feet apart, and planted with selected varieties; also larger trials in convenient plots of the following:—

No.	Name.	Remarks.
		Wheat.
1.	Viking	A variety sent for trial; strong plant.
2.	Morocco	A variety from the Mediterranean; very strong.
		Barley.
3.	(No name)	An unnamed variety from Finland; very weak, a plant only showing here and there.
		Oats.
4.	Danish Island ...	A variety from the United States of America; good plant.
5.	Burpees Welcome ...	" " " " " "
6.	Golden Giant-side Oats	" " " " " "
7.		An unnamed black variety from Finland; good plant.

MISCELLANEOUS CROP.—A plot of one-eighth of an acre has been sown with a variety of "Sulla" from Russia for trial The area under asparagus has been considerably increased. Five rows, each 6 chains long, have been added. It was planted in August, but scarcely made a move until the January rains set in. Since that time the plantation has made robust growth. The following garden crops were grown on a block near the house, but owing to the drought none throve satisfactorily until the autumn months. Artichokes (Jerusalem) yielded heavily. Beet: Of 6 varieties under trial Crimson Globe did the best. Capsicums and chillies (10 varieties) did well in autumn. Lettuce and endive (6 varieties) doing well. Egg plants, okra, tuks, salsafy, spinach, parsley, and radish did fairly well. Eight varieties of tomatoes made but slow growth, and failed to fruit until the autumn, when they cropped abundantly. Many other vegetables were sown and planted, but, owing to insufficient rains and other climatic influences, were more or less failures. A ¼-acre block of "saltbush," however, stood the drought admirably.

ORCHARD AND VINEYARD.—The orchard trees withstood the climatic condition of last year better than could have been expected. After the drought, the most serious drawback was the result of a heavy hailstorm, which occurred on the 10th January, and which appeared at the time to have ruined the prospect of any crop of fruit. But certain fruits, notably pears, withstood the attack, as did also some of the grapes where the foliage was thick enough to protect the bunches. Apricots and peaches were very poor indeed. Plums, where sheltered, produced a few fairly good cases. Apples and pears were of very good quality, and the consignments despatched brought good prices. It is satisfactory to note that not a tree or grape vine succumbed to the drought. The ground has been kept continuously cultivated and free from weeds. Summer pruning has been attended to. Insect and fungoid pests have been carefully looked for, and, when their presence has been detected, they have been eradicated by spraying solutions.

In the vineyard the crop, owing to the above-mentioned climatic conditions, was very much below the average, but we have never had a finer sample of grapes to offer. The wine varieties were sold in Brisbane at £8 per ton., f.o.b; Westbrook and table grape, 3d. to 4½d. per lb. The earliest table sorts fit to market were the "Madeline Royal" and "Chouch," on the 22nd December, and the "Chasselas" varieties following in the first week of January.

The orchard branch is under the supervision of Mr S. C. Voller, who has by lectures, by personal interviews with farmers, and by articles in the *Agricultural Journal* largely contributed to the advancement of the fruit-growing industry.

Improvements.—The flooring of the shed behind the stables has been completed, and the four stalls at the end roofed with iron. The new vineyard, consisting of 3 acres, has been staked with 3-inch by 3-inch seasoned hardwood posts. Two bedrooms and a covered way have been added to the manager's residence, and a substantial "silo," 10 feet by 10 feet, with a movable roof and cement floor, has also been erected. All property has been kept in repair and new work done where required.

Exhibitions.—During the year the products of the farm were largely represented at three of the most important Exhibitions in the State, viz.:—the National Agricultural and Industrial Association, held in Brisbane, in August last; the Royal Agricultural Society, also in August; and the Drayton and Toowoomba Agricultural and Horticultural Society's Show, held in February. Both the latter were held in Toowoomba. The first was a combined display of Westbrook and Hermitage State Farms, and considering the unpropitious season and the magnitude of the exhibit, it was the object of very favourable remark.

The display of exhibits from this farm at the "Royal" was also very fine, especially in the farm roots and vegetable sections. But the best exhibit I have seen staged in this State was that shown at the last summer show in Toowoomba. The effect was striking. It was comprehensive and instructive, and the individual excellence of the specimens has never been excelled by any collection hitherto brought together. This was in the midst of the severest drought ever known in the country. It is very gratifying to know that my efforts in this direction were appreciated by the Minister, the Drayton and Toowoomba Agricultural and Horticultural Society, the Press, and the general public.

Working Staff.—The working staff for the past year has consisted of four men, as against five previously; the farm stock, of 10 field horses, 1 hack, and 1 harness mare (12 horses as against 17).

C. ROSS, Manager.

REPORT OF THE MANAGER, STATE FARM, HERMITAGE.

Sir,—I have the honour to submit my Report for the year ending the 30th June, 1903:—

Rainfall.

Month.		No. of Inches.	No. of Rainy Days.
July,	1902	0·05	1
August	,,	1·03	6
September	,,	0·80	4
October	,,	2·89	7
November	,,	3·76	6
December	,,	4·43	8
January,	1903	0·28	2
February	,,	2·80	4
March	,,	1·58	8
April	,,	0·14	3
May	,,	7·18	11
June	,,	0·07	1
Total		25·01	61

The past year has been probably the most disastrous experienced in this locality since agricultural settlement took place.

Except in a few isolated patches of country visited by storms, no wheat, barley, or oats were harvested. I regret to inform you that all the experiments carried out with these crops, as enumerated in last report, failed for want of moisture.

This unfortunately set our most important branch back considerably—*i.e.*, "The selection and propagation of approved strains of wheats."

Luckily, sufficient seed was retained to admit of the majority of these not being altogether lost.

MAIZE.—During September and early October an area of 27 acres was sown, half with Ninety Day and half with Amber Queen, using 7 lb. of seed to the acre. As this sowing was on recently broken up and worked land, seed did not germinate too well, and even then there was not sufficient rain at tasselling time to ensure setting of cobs. The crop was fed off by working horses, and proved acceptable at a time when grass was backward.

On the 22nd October, after marking out rows 4 feet apart, areas of 1 acre each of the following varieties of maize were sown with the "Moline" drill, distributing approximately single grains 18 inches apart, and using from 6 lb. to 7 lb. of seed per acre, according to size:—Golden Beauty, Riley's Favourite, Legal Tender, Improved Leaming, Piasa Queen, Amber Queen, Ninety Day, and Leaming.

These crops were scuffled twice and then slightly hilled with plough.

Heavy storms in December caused a very rapid and succulent growth. Plants, in their endeavour to reproduce themselves quickly, ran into "tassel," but owing to evaporation of surface moisture by excessive heat, accompanied by hot winds early in January, crops wilted beyond recovery. To turn these stalks to account, they were cut and put into "shocks," resulting in a return of from 1 to 1½ tons of cured fodder per acre. Piasa Queen gave the highest and Leaming the lowest yield.

An area of 30 acres of Leaming maize was sown in a similar manner to above-mentioned varieties, using 6 lb. of seed to the acre.

This crop also wilted in January, and was cut with the binder, a portion being made into silage in the stack and the balance stooked and cured into hay.

SORGHUMS, &c.—The following varieties were drilled in with "Reid and Gray" drill on 15th October, in drills 2 feet 6 inches apart, principally in ½-acre areas:—Sorghum saccharatum, Planters' Friend, Amber Cane, Coleman Sorghum, Early Orange Cane, Red Kafir Corn, White Kafir Corn, Folger's Early Sorghum, Broom Millet, Brown Dhoura, Jerusalem Corn, Soudan Millet.

The securing of good seed was not possible on account of dry weather at flowering time, so the crops were cut, stooked, and afterwards stacked as a standby for winter.

The first five gave the best results; No. 2 attained the maximum quantity of cured fodder, amounting to 3 tons 12 cwt. per acre.

A useful second growth was made after rain fell.

PUMPKINS.—Eight acres were planted with Mammoth Tower and Long Tom cattle pumpkins, also Ironbark, Crown, and Button. Only a light crop was obtained from a second growth of vines.

COWPEAS.—The following areas were drilled in with clay-coloured and black peas as rotation crops:—

2·40 acres	on	20th October, 1902,	using	7 lb.	of seed per acre.
15·00	,,	17th November, ,,	,,	9 lb.	,,
8·00	,,	5th January, ,,	,,	9 lb.	,,

In the first and last sowing the seed germinated sparingly on account of want of moisture.

The November planting gave the best results.

When once established, this plant withstands much heat and dry weather.

A quantity of cowpea hay was obtained and cured in racks.

COTTON.—Varieties mentioned were raised from seed, but the plants, after battling against adverse conditions, failed to mature; the January heat and hot winds supplying the finishing touches. Uplands cotton: Doughly, Culpepper, Parker, Russell, Christopher, Jones's Big Boll, Truitt, Braddy, Seabrook, Sea Island.

WHEAT.—The recent introduction of South Australian wheats, and their distribution to localities with such widely differing conditions, renders it imperative that an official test may be made.

To this end, sowings have been made of each variety after treatment of the respective samples with bluestone. Particulars are as follow:—All seed was drilled in at the approximate rate of ¾-bushel per acre.

Name.	Area Sown. Acres.	When Sown. 1903.
Dart's Imperial	5	16th May
Smart's Early	5	18th „
Petatz Surprise	5	18th „
Gluyas	5	18th „
Newman's Early	5	19th „
Hamlyn's Prolific	5	19th „
Leatherhead	5	19th „
Baroota Wonder	5	21st „
Carmichael	5	21st „
Warwick	1	28th „
Australian Wonder	1	28th „
Marshall's No. 1	1	28th „
Budd's Early	3	10th June
Early Para	1	12th „
Silver King	1	12th „
Steinwedel	1	12th „
Fidbag	1	19th „
Tuscan	1	19th „
Marshall's No. 3	0¾	19th „
Allora Spring	3⅕	19th „

Additional wheats as detailed have been drilled in similarly to above—

Name.	Area Sown. Acres.	When Sown. 1903.
Marshall's No. 8	5	9th April
Bobs	5	12th May
Federation	5	13th „
Sullivan's Early Prolific	5	14th „
Marshall's No. 3	3 6/10	25th „
Yandilla	3⅓	25th „
Manitoba	1	28th „
Farrar's 85 A1, B1	3	28th „
Farrar's 84 BY	3	29th „
Indian Fife	3	29th „
Australian Wonder	3	30th „
Battlefield	0¾	30th „
Farrar's R	0⅕	30th „
Yandilla Imported Indian	1½	22nd June

BARLEY.

Name.	Area Sown. Acres.	When Sown. 1903.
Hallett's Imported Chevalier	6⅓	15th May
Sea of Azov	5	14th „
Mould's Imported	0¾	22nd June
Nepaul	4	5th March

RYE.—Three acres were drilled in on 6th March, and the crop is being used as green feed.

OATS.—Twenty acres of Algerian were broadcasted on 16th and 25th June at the rate of a trifle over 2 bushels per acre.

WHEAT—*Experiments with Fertilisers.*—Details of above experiments, occupying 24 half-acre blocks, have been given in a previous report. Owing to failure of crop last season, fertilisers were not applied this year. Plots were sown with Budd's Early wheat previously pickled at the rate of ¾-bushel per acre on 9th and 10th June.

Stud Wheats.—This collection comprises some 70 odd carefully selected strains, originating principally from Mr. Farrar's crossbreds. These have been selected from a large collection, embracing some hundreds, on account of their adaptability to soil and climate. In the majority of cases, areas of one-twentieth of an acre have been drilled in with the respective samples, by means of Planet Jr. hand-drill, in rows 16 inches apart. Seeds of some promising "sports" have been sown; also a number of other samples of imported wheats.

Oats.—Appended are the names of varieties sown on 11th June to test their adaptability to locality:—Abundance, Algerian, American Banner, Black Winter, Carter's Royal Cluster, Clydesdale, Danish Island, Dun Oat, Egyptian, Golden Giant, Hopetown, Lincoln, Peerless White Bonanza, Pioneer, Red Rust Proof, Skinless, Swedish, White Tartarian, Tarter King, Waverley, Welcome, Wide Awake.

Barley.—Similarly to oats, small plots of the undermentioned have been sown on 13th June—Kinver's Chevalier, Golden Grain, Webb's New Golden Giant, Early Purple, Carter's Malting, Invincible, Hallet's Chevalier, Half-awned, and Chilian Chevalier.

Experiments with "Bunt" Infected Seed.—Sixteen varieties of wheat were received from Mr. Farrar, of New South Wales, who had infected samples with "bunt" to test the relative immunity of different varieties. To make comparisons as conclusive as possible, similar collections are being tested in New South Wales, Victoria, and South Australia.

Paspalum dilatatum.—Eleven thousand roots of this grass have been planted out, on 19th May, in rows 3 feet apart, sets 2 feet apart in the row.

Marrows and Squashes.—A collection of these has been raised—Early Orange, Hubbard, Delicata, and Custard showing out prominently among the squashes, while the Long Fruited Bush marrow gave best results in its class.

Various garden stuff has also been grown, tomatoes doing particularly well in the early part of the season.

The Orchard.—Notwithstanding the dryness in the early part of the fruit season, and the hailstorm which injured the apricot crop principally, some excellent fruit was marketed, and prices were satisfactory for all fruit of good quality.

Land occupied by trees has been cultivated twelve times during the year, besides hand-hoeing along strips and about trees.

Routine work has consisted of pruning, spraying, suckering, gathering, and marketing of fruit, &c. Three hundred and seventy odd cases of assorted classes of fruit have been sold.

Mr. S. C. Voller has directed operations in this branch, and is, I feel sure, justly proud of producing such excellent fruit after the severe drought.

The Vineyard.—Work in this branch is under Mr. Rainford, the Viticulturist. This year the usual late frost luckily did not appear and cut back young shoots to the old wood. To this I attribute the phenomenal success of some of the varieties of grapes: Gordo-Blanco, White Syrian, Raisin de Calabre, Raisin de Dames, Black Prince, Royal Ascot, and Chasselas—matured bunches of grapes worthy of any hothouse. As an instance of the size of the grapes from the last-mentioned variety, three berries weighed 1 oz. The vineyard was "scuffled" three times during the year, and was lightly ploughed five times. After winter pruning the vines were dressed with sulphuric acid solution, and during early spring were sprayed with Bordeaux mixture with gratifying results.

Improvements.—A silo, 12 feet by 10 by 10 feet, has been added to our farm buildings. The framework and sheeting (the latter 6 inches by 1½ inches, tongued and grooved) are of seasoned ironbark. The roof is constructed on small wheels, to allow for rolling off on to the framework attached for the purpose. The silo has been filled with lucerne; capacity, about 30 tons.

A representative collection of produce was made at the last National Show in conjunction with Westbrook.

H. C. QUODLING, Manager.

REPORT OF THE MANAGER OF THE STATE FARM, BIGGENDEN.

Sir,—I have the honour to submit the following report on the work carried out on the above farm for the year ending 30th June, 1903:—

The disastrous drought which prevailed during the greater part of the previous year still continued throughout the first six months of the year under review. Under those conditions, the usual amount of experimental work could not be carried out, and the time which would otherwise have been devoted to the raising of the different crops had to give place to the keeping alive of the young fruit trees and vines.

From November, 1901, to September, 1902, no rain fell to be of any benefit to either the orchard or vineyard. The few showers that did fall were scarcely sufficient to moisten the surface of the ground, yet in the face of those trying conditions I am able to report that not a single tree or vine perished. The secret of this success did not lie in having an irrigation system to fall back upon—the well, the only water supply on the farm, having gone dry and all water having to be carted a distance of 2 miles—but in thorough and systematic cultivation. Since the breaking up of the drought in December, the climatic conditions have, on the whole, been favourable for the growth of the crops grown on the farm.

I attach herewith an abstract of the meteorological observations taken at the farm during the year under review.

EXPERIMENTS WITH MAIZE.—The experiments carried out with this crop consisted of a further testing of the varieties received from America in 1901. Field 9 was planted on 3rd October with the following sorts:- Riley's Favourite, Golden Beauty, Piasa Queen, Leaming, Legal Tender. Owing to a light fall of rain shortly after planting, all varieties were through the ground by the 20th. No rain, however, fell during the following month, and, there being no bottom moisture, all hope of getting a crop disappeared. In an ordinary season the crop would have been at once cleared off, and a further sowing made; but fodder being scarce, and no sign of the drought breaking, it was allowed to remain on the ground and cut as required for stock feed. The ground was thoroughly worked up between the rows and a fresh sowing made.

On the removal of the old crop, sulphate of ammonia was applied at the rate of 1 cwt. per acre. A small area of each plot did not receive any manure. The crop made fair growth until the flowering was reached, but, unfortunately, at that time no rain fell. This again spoiled all chances of getting a good return. Thinking that a subsequent sowing might meet the same fate, and not wishing to lose the varieties, the crop was allowed to come to maturity and harvested on the 13th of April. It would be misleading to give the returns from the individual varieties, as those plots on which the old crop was first removed had the greater advantage. Taken as a whole the returns were: For the manured, 19 bushels per acre, and for the unmanured, 14 bushels per acre. This leaves a profit of 5s. in favour of the manure.

A subsequent planting was made in Field 10. For this sowing the climatic conditions were much more favourable. The results obtained were as follow:—

American Varieties.	When Sown.	When Harvested.	Returns per Acre. 1903.	Returns per Acre. 1902.
Riley's Favourite ...	2nd January ...	25th May ...	38 bushels ...	20 bushels
Golden Beauty ...	" ...	" ...	30 " ...	19 "
Piasa Queen ...	" ...	" ...	28 " ...	17 "
Legal Tender ...	" ...	" ...	27 " ...	26 "
Leaming	" ...	" ...	20 " ...	17 "

Other Varieties.	When Sown.	When Harvested.	Returns per Acre.
Golden Nugget ...	3rd January ...	25th May ...	42 bushels
Golden King	" ...	6th June ...	39½ "
Early Yellow Dent ...	" ...	25th May ...	36¾ "
Hawkesbury Champion	" ...	6th June ...	33 "
Early White Horsetooth	" ...	25th May ...	26½ "
Argentine	" ...	" ...	22 "

Barley.—Owing to the severity of the drought, only a small area was put under crop last season, the results being nil. This season the conditions for sowing were much more favourable. On 11th May, Field 11 was sown with the following varieties:—Hallet's Improved, Sea of Azov, Chevalier; and Field 2, with Cape, Chilian, Nepaul, Golden Drop, and Windproof. The soil was in splendid order for the reception of the seed, and, so far, all look healthy, and are coming on well.

Wheats.—Field 8 has been divided up into plots of one-tenth of an acre, each of which was sown on 16th May with the following varieties:—

Early Para	Carmichael	Yandilla
Gluyas	Tangiers Variety	Yandilla Improved Indian
Australian Wonder	Leatherhead	Farrar's R.
Hamlyn Prolific	Petatz' Surprise	Farrar's 84 BY
Silver King	Indian Fife	Farrar's 85 A1 and B1
Baroota Wonder		

The seed previous to sowing was pickled by the "bluestone" method. In all plots the seed germinated from the seventh to the eleventh day after sowing. As wheat-growing is practically new to the district, the result of this experiment is awaited with interest.

Oats.—Two varieties—Tartarian and Algerian—have been sown in the 4 acres of land recently brought under cultivation from Grass Paddock No. 1.

LEGUMINOUS CROPS (Field).

Cowpeas.—Those were grown in orchard between rows of fruit trees, and sown 24th October. The method of planting consisted of dropping the seeds by hand in every second furrow when ploughing, the amount of seed used being about 8 lb. per acre. The crop came on well in spite of the drought, and when coming into pod was used to great advantage as a pig feed. Shortly after the crop came into bearing a bug appeared, which did considerable damage by piercing the pods and sucking the juices from the seeds. Later on, the pest became less troublesome, and sufficient seed was secured for further sowing. The varieties grown were White's Perennial, Black, Clay, Large Black Eye, Small Black Eye, Piebald, Large White, Large Purple, Small Purple, and Grey. From a green manuring point of view the White's Perennial is the most useful variety. It is somewhat late in coming into bearing, but this is a rather valuable point, for, if the land is not at once wanted it will, by its luxuriant growth and perennial habit, keep down everything in the shape of weeds. There is very little to choose from between the Black, Clay, Grey, and Large Purple sorts. All are good croppers and give a large amount of both green material and seed. The Large White is worth growing for table use. The Small Black Eye is the earliest of all, but owing to its light cropping qualities is scarcely worth growing.

Beans.—Sown 24th October, between rows of trees in the citrus orchard. The manner of planting was the same as in the case of the cowpeas, only the seed was dropped in every fourth furrow instead of second. The manner in which they kept on growing during the two months' dry weather experienced after planting was truly remarkable.

The following varieties were tested as to their suitability for green manures and the amount of vine produced per acre when they had reached the blossoming stage—the correct time to plough under—was as follows:—

	Tons	cwt.	qr.	lb.		Tons	cwt.	qr.	lb.
Black Mauritius ...	14	19	3	18	Florida Velvet ...	12	0	0	0
Tonga	13	13	3	0	Green Mauritius	11	17	2	20
Mottled Mauritius	12	4	0	0	Poor Man's ...	9	16	1	24
Small Mauritius ...	12	0	0	0	Climbing Lima ...	9	3	2	8

Samples of the above have been forwarded for analysis, and when the results come to hand their full respective value as nitrogen producers, &c., will then be known.

SORGHUMS.

Field 6.—Sown on 27th October and 2nd January, in rows 3 feet apart, by means of the Planet Jr. seed-drill. The first sowing made but little headway until the rains came in December, when rapid growth took place, resulting in a large amount of green fodder, which came in very useful at that time as feed for the farm animals. It also gave a very fair ratoon crop.

For the second sowing the weather was more favourable, and it did well from the start. The amount of green stuff yielded per acre of the respective sorts is as follows:—

	Tons	cwt.	qr.		Tons	cwt	qr.
Planter's Friend ...	27	10	3	Teosinte ...	10	16	2
Collier	13	9	9	White Kafir Corn	9	10	1
Folger's Early ...	12	13	3	Giant Honduras	9	3	2
Coleman	11	6	3	Egyptian Corn ...	7	12	1
Early Orange ...	11	4	0	Brown Dhoura ...	5	13	1
Saccharatum ...	11	2	3				

The season was too short for the Giant Honduras, which is generally a very heavy cropper, and also a good ratooner. The same remark applies to the Teosinte, which is more at home in the North. Seed has been secured from all varieties, but has not yet been threshed out.

PANICUMS AND MILLETS.

Field 10.—Advantage was taken of the showers that fell in October to put in the following varieties of the above:—*Setaria Italica*, *Setaria Germanica*, *Panicum Miliaceum*, *Panicum Texanum*, Dakota Millet, *Pennisetum spicatum*. The seed was sown on the 6th, and by the 13th all varieties, with the exception of the *Texanum*, had germinated. No rain, to do any good, fell for two months after sowing, consequently the little moisture in the ground soon disappeared. The result was that both the *Miliaceum* and Dakota varieties failed. The *Italica* and *Germanica* gave a fair crop, while the *Texanum* did not germinate until the December rains. It then, as well as the *Pennisetum*, made good headway, but had to be cut down before coming to its best, as the land was required for other crops. Another sowing of the abovenamed varieties was made on 21st December.

Field 6.—Practically the same results were again obtained. The *Pennisetum* on this occasion made very rapid growth, and is wonderfully prolific. It was harvested 12th April, tied into bundles, stooked, and, when dry, the seed was threshed out. From the quarter of an acre grown, 4 bushels of seed were secured. The dry stalks, after being cut into chaff, were readily consumed by the farm horses.

Grasses.

In the last annual report of this farm it was mentioned that as soon as ground was available, and weather permitted, the area devoted to this most important branch would be extended, and the further testing of both native and exotic grasses, likely to prove suitable to this district, be gone on with. This has now been accomplished by clearing and breaking up new ground adjacent to Field 1. On 30th March twenty-six varieties of grass and other fodder plants were sown, each—with the exception of the saltbushes—occupying a plot 3 feet wide and 1 chain in length. The names of those experimented with are as follow:—

Perennial Rye	Rib	Mitchell—*Astrebla pectinata*
Italian Rye	Cocksfoot	,, *A. triticoides*
Timothy	Sheep's Fescue	,, *A. elymoides*
Prairie	Crested Dogstail	Red Perennial Clover
Meadow Foxtail	Sweet Scented Vernal	White Clover
Meadow Fescue	Guinea	Saltbush—*Atriplex nummularia*
Evergreen Meadow	*Paspalum dilatatum*	,, *A. semibaccata*
Smooth-stalked Meadow	*P. galmarra*	,, *A. halimoides.*
Rough-stalked Meadow	*P. platycaule*	

Germination, although in many cases slow, has on the whole been satisfactory. The sorts proving the most difficult to establish are—Evergreen Meadow, Sheeps Fescue, Timothy, and Guinea. All will be under the closest observation, and qualities, such as drought resistance, carefully noted.

Root Crops.

Field 2.—Considering that dairying is one of the principal industries in this district, the question of providing suitable winter feed for the milking herd is a very important one. So far the growing of root crops for this purpose has not yet been attempted, therefore the experiments now being carried out are proving to many of much interest. It was intended to make a succession of sowings, commencing in September, but the prevailing dry weather did not permit of this being done. The first sowing was made of the following varieties on 4th February:—

Mangels.—Long Red, Long Yellow, Yellow Globe.

Beets.—Vilmorin's Improved Sugar Beet—round variety from Greece.

Swede Turnips.—Skirvin's Purple Top, Champion Smooth, Green Top.

Kohl-rabi.—Green and Purple.

The seed was sown by means of the Planet Jr. seed-drill, the mangels in rows 3 feet apart, the turnips, beets, and kohl-rabi 2 feet 6 inches apart. When large enough the mangels were thinned out to a distance of 18 inches, the others to 12 inches in the rows. With the exception of the kohl-rabi all sorts have made excellent growth, and will soon be ready to be taken up. A further sowing was made on 10th March. Although coming on well, still they have not made the rapid growth of the previous sowing.

Full details of this experiment, together with results, will be submitted for publication in the *Agricultural Journal.*

Sweet Potatoes.—Field 3: Of this most useful crop, four varieties were experimented with, viz.:—Rosella, Spanish Giant, Yellow Spanish, White Maltese. Cuttings were planted during October, November, and December as weather permitted. Several ways of planting were adopted, but the yield from the respective methods have not yet been ascertained. Details of this experiment will also be submitted for publication in the *Journal.*

Sweet Cassava or Tapioca (*Manihot Aipi*).—Field 1: On 24th October a number of cuttings of the above were obtained from the North and planted in rows 4 feet apart. The soil being moist at the time young shoots soon made their appearance, and by the end of January had developed into shrubs some 4 feet in height. The crop has not yet been harvested, consequently the yield of roots cannot be given. Some roots dug up for show purposes, measuring 3 feet in length, and 3 inches to

4 inches in thickness, were grated down and yielded a fair proportion of starch. A large quantity of cuttings are now available for planting out, and next season this crop will be tested on a much larger scale, not so much as a starch producer, but as a pig food.

Arrowroots.—Both the Queensland (*Canna edulis*) and the Bermuda (*Maranta arundinacea*) are being grown, but the yield is a good deal below the average.

PUMPKINS.—The pumpkins were sown in the spaces left between the maize varieties. Of the two sowings made—October and January—the best results were obtained from the latter. Several sorts were grown, of which the best were Ironbark, Crown, Turk's Cap, and Button.

MARROWS.—Long White, Long Green, Long Yellow, Bush Green, Rice, and Golden Crookneck all did well. The squashes were named in order of excellence—Hubbard, White and Yellow Custard, Delicata, Fordhook, and Perfect Gem.

MELONS.—The crop grown, both of the water and rock varieties, was the best I have ever seen. Of water sorts the best were—Cuban Queen, Semonile, Black Eyed Susan, and Dixie. Of rock—Bay View, Banana, Skellman's Netted, Montreal Nutmeg, and Montreal Market.

TOMATOES.—Twenty-four varieties. Sown in transplanting tins early in August, planted out beginning of October. Did not do too well until late in the season. As an all-round tomato, the Wonder of Italy still holds its own. Ponderoso, Duke of York, American Red Stone, Golden Champion, and Crimson Cushion produced fine fruits of good quality.

GARDEN PRODUCE.—A varied collection of plants suitable for household use has been successfully grown, such as cabbages, cauliflowers, carrots, peas, beans, onions, cucumbers, beets, turnips, &c.

SUGAR-CANE—This crop withstood the drought remarkably well. It was cut down for stock feed in October and allowed to ratoon. Of the twenty-six varieties experimented with, the following show from 3 feet to 4 feet of marketable cane:—Rose Bamboo, Batoe, Cheribon, and Malabar. All sorts have been cut down lately by frosts.

COTTONS.—The seed of the nine American varieties received from the head office in October was germinated in seed beds and transplanted out in the field on 11th November. It was not until receiving the January rains that they made anything like fair growth. From the Uplands sorts—viz., Doughty, Truilt, Christopher, Parker, Russell, Jones' Big Boll, Braddy, and Culpepper—a fair picking was obtained. For the Sea Island variety—Seabrook—the season was evidently too short. It made the strongest growth of any, but the bolls failed to open. Samples of the respective sorts have been submitted to experts so as to ascertain their market value. This information has not yet come to hand.

FIBRES.—Sisal Hemp (*Agave rigida*), *Fourcroya gigantea*, Manilla Hemp (*Musa textilis*), Ramie (*Bœhmeria nivea*) are being grown, but have not yet reached the stage to be treated for fibre.

ORCHARD.—All trees suffered more or less from the long-continued drought, but it is gratifying to be able to report that not a single loss was sustained during the past year. It may be said that the rains that fell during December gave the orchards the first real soaking that they have had since being planted out. An additional 68 young Japanese plum-trees were planted out during August, made up of the seven following varieties:—Burbanks, Chabots Gold, Chalco, General Saigo, America, October Purple. Although planted under the most trying conditions, all grew, and have, moreover, made very good headway. Mr. S. C. Voller, the Assistant Instructor in Fruit Culture, who superintends the working of this portion, gave a demonstration on pruning to a large gathering of local residents.

VINEYARD.—Much interest is still being taken by residents of surrounding districts in the working of this branch. Last season a large number of cuttings were applied for and distributed. The crop—a very fair one considering the season—was disposed of locally. Mr. E. H. Rainford, who has charge of the pruning, grafting, &c., gave several demonstrations in connection with his work.

STOCK.—Prior to the break-up of the drought, the services of the stud bull Lord Harry, stationed at this farm, were not much in request. During the past six months, however, 21 cows have been received, which shows that, as the seasons get better and ticks less troublesome, there will be more demand for his services.

The same remarks apply to the stud boar. The number of sows received also totalled 21. Six pedigree boars and 6 sows were sold during the year.

IMPLEMENTS.—No new additions have been made during the year. All are in good working order. Most of the implements have been repainted.

IMPROVEMENTS.—Four acres of new land adjacent to Field 1 have been cleared of timber, and are being brought under cultivation. The "Dropper" fence dividing the cultivation from the grass paddock has been moved to include this area.

VISITORS, &c.—That deep interest is being manifested in the operations carried on here is shown by the increasing number of farmers and settlers who visit the farm. The number recorded during the year amounted to 1,058. Every facility is given to those visitors requiring information in any of the branches represented.

A new departure, in the form of an agricultural instruction class, for the benefit of the youths of the surrounding districts, was commenced in October and continued until March. It was held in one of the farm buildings on Saturday afternoons and was well attended, the pupils taking a lively interest in the various subjects taught.

A collection of the products grown on the farm was exhibited at the Degilbo show.

The outlook for the coming year is very promising.

ABSTRACT of METEOROLOGICAL OBSERVATIONS taken at STATE FARM, BIGGENDEN, for the YEAR ending 30th JUNE, 1903.

Temperature, &c.	1902.						1903.						Averages, &c.
	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April.	May.	June.	
Extreme maximum	81·0	78·50	91·0	93·50	99·0	101·0	102·0	101·50	94·0	94·0	80·50	77·50	Extreme maximum temperature 102°, 5th January.
Mean maximum	73·87	74·74	81·30	84·51	89·66	93·08	92·12	86·44	87·71	80·53	73·30	73·06	Mean maximum temperature, 82·52.
Extreme maximum	29·0	30·0	32·50	48·0	46·0	56·0	59·50	59·50	60·0	39·0	34·0	23·0	Extreme minimum temperature, 23°, on 22nd June.
Mean maximum	40·40	41·61	45·80	56·21	57·03	63·17	63·20	64·25	64·72	54·80	48·50	37·83	Mean minimum temperature, 53·12.
Extreme terrestrial (ground thermometer)	18·0	17·0	28·0	43·0	44·0	50·50	53·50	57·0	50·50	30·0	26·0	16·0	Extreme terrestrial temperature, 16°, on 21st and 22nd June.
Mean temperature	51·08	58·17	63·55	70·36	73·34	78·12	77·66	75·34	76·21	67·66	60·90	55·44	Mean temperature, 67·81.
Rainfall—inches	·08	·04	1·58	2·34	·25	8·08	2·25	3·15	3·95	0·16	6·07	2·07	Total rainfall, 30·02 inches.
Number of days on which rain fell	2	2	6	7	4	14	7	7	14	2	12	4	Total number of days rain fell, 81.

G. B. BROOKS, Manager.

REPORT OF THE MANAGER OF THE STATE FARM, GINDIE.

SIR,—In submitting my Annual Report for the year ending 30th June, 1903, I have the honour to state that, owing to the prevailing drought that this part of the State was suffering from, the whole area of land that was planted with cereals in May and June of last year was a total failure. From May to September the rainfall here amounted to only 10 points. The 3·15 inches of rain which fell in February, 1903, brought most of the wheat up, but it only survived for a short time, owing to the intense heat that was prevailing at the time.

On the 1st July the balance of farm horses were taken on to the Dee River for agistment. One buggy horse and two that were too poor to take away were all that remained at the farm. On inspecting the cattle and horses that were sent away previously, I was much gratified to find them looking better than I expected to find them.

Up till 13th June I had felled scrub and bottle-tree to endeavour to keep the sheep alive, but as they had commenced to die they were boxed with a flock belonging to the Daniels Bros., and sent down the line on agistment, where they remained till 6th October; but, owing to the continued dry weather and their inability to secure fresh country, the Daniels Bros. were compelled to sell their sheep; and, as we were in no better condition in respect to feed than when the sheep were sent away, I was reluctantly compelled to sell them. I very much regretted having to take the course, as, notwithstanding the fact that the seasons had been going from bad to worse from the time the sheep were purchased until they were sold, and, after taking into consideration the cost of their agistment, they still show a balance on the credit side. A small flock would have been very handy this season in keeping down the growth of grass and weeds in the cultivation paddocks.

In December 2,000 *Paspalum dilatatum* roots were planted in one of the smaller paddocks, and part of these roots were planted with the hoe and the balance were put in drills opened with the plough. The plants were placed in position and the soil put about them by hand; the furrow was then filled in with the hoe. The land was moist when most of the plants were put in, and the greater number of them started to grow, but the heat in December and January appeared to be too much for it. I do not think the grass will do well in this district. In low, shady parts it may do fairly well, but in the open it does not grow at all during the hot weather.

The following varieties of maize were planted amongst the fruit trees:—Leaming, Legal Tender, Golden Beauty, and Riley's Favourite. Twenty-four varieties of sweet corn were also planted. In the cultivation paddock 7½ acres of maize were put in, also 15·9 of cowpeas, 5·62 of *Setaria Germanica*, 1 acre Dakota Millet, and small trial plots of the following sorghums:—Coleman, Early Orange, Folger's Early, and Collier. Though we had sufficient rain in December to give the above crops a good start, the light rainfall and the heat of the two following months, and the total absence of moisture in the subsoil, prevented these crops from maturing.

About 2 tons of hay were cut from the setaria. The maize was cut and saved for fodder.

A further area of 10 acres of maize that was planted in January was also cut for fodder, as it failed to cob. Sufficient seed for next season was about all that was obtained from this plot.

On 16th January I left here for the Dee River to bring the cattle and farm horses home. Owing to the failure of both feed and water, Mr. Moller, in whose charge the cattle and horses were placed, leased two large blocks of relief country. By doing this he was enabled to hand the stock over in good condition. We had some difficulty in collecting them, as they were spread over a large area of country. One hundred and sixty-three head of cattle were delivered to Mr. Moller. I mustered 129 head. These were put through the dip and started for home. One beast got injured, and 4 others went blind. These had to be left behind, and will be brought on with about 10 head that are in Mr. Moller's possession at present date. The losses were light, considering the hardships the cattle had to go through, including inoculation, which was answerable for a good few deaths. There has been an increase of 7 head, so that at present we are only 24 short of the original number.

The following is the area and varieties of wheat sown here this season up to present date:—

	Acres.		Acres.
Marshall's No. 3	41·13	Brought forward ...	125·80
Budd's Early	11·21	Lucerne	10·4
Dart's Imperial	24·65	Rye	2·1
Allora Spring	37·16	Oats	1·0
Thirteen varieties	11·70	Orchard	4·0
	125·80	Total area under crops ...	143·70

I regret to say the supply of water in the wells is getting gradually less. It is only constant attention to the windmills that enables us to get sufficient water for present requirements. Both the wells require to be deepened before the summer, as the present supply of water would be of no use during hot weather.

All the wheat that is up is looking well, and, if we are favoured with an occasional shower the next two or three months, we may expect a good crop, and I earnestly hope that this may be the case, as it will give an impetus to agriculture in this district.

The days on which rain fell during the year 1902-3 was as under—

		No. of Wet Days.
July	Nil ...	0
August	Nil ...	0
September	0·100 ...	1
October	Nil ...	0
November	1·650 ...	3
December	7·135 ...	11
January	1·425 ...	5
February	3·150 ...	4
March	0·540 ...	3
April	0·195 ...	3
May	3·310 ...	8
June	Nil ...	0
Total	17·505 inches ...	38 days.

STATE FARM, GINDIE.

Return for the year ending 30th June, 1903.

	Acres.
Area under crop	143·7
Details of Crop—	
Fruit trees	4·0
Lucerne	10·4
Rye	2·5
Oats	1·0
Wheat—	
Marshall's No. 3	41·13
Budd's Early	11·21
Dart's Imperial	24·60
Allora Spring	37·16
Thirteen varieties	11·70
Total	143·7
Area ploughed	143·70
Decrease in area under crop last year	77·17
Stock—	Head.
Horses	17
Cattle	141

No improvements done during the year.

REPORT OF THE MANAGER OF THE STATE NURSERY, KAMERUNGA, CAIRNS.

Sir,—I have the honour to submit my report for year ending 30th June, 1903.

A very exceptional season was experienced this year. The drought continued with increased severity up to the end of 1902 and was followed by a heavy wet season. The drought was not, however, so severely felt within the coastal belt of agricultural country in the north as in many parts further south and west in the State, but it was, nevertheless, unprecedentedly dry. The rainfall gauged during the first six months of the season amounted to 10·440 inches, of which the greatest fall was of 4 inches in July. During the four months from January to April 87·955 inches fell, and in May and June only 2·645 inches. In all, 101·040 inches were recorded as against 53·892 inches in 1901-02.

During the drought several plants suffered from want of moisture, which was accentuated by the fact of the Barron River, from which the water supply for the Nursery is obtained for purposes of irrigation, running so low as to become brackish, thus rendering the water useless, and in some instances dangerous to delicate plants.

The heavy wet season was also very trying to certain plants, but the specially noticeable effect was the abnormal growth of weeds, especially burrs, and grasses immediately following, occasioning a great deal of labour in weeding on the Nursery. During the comparatively light wind storm experienced here during the period of the Townsville cyclone "Leonta," a portion of the large weeping fig-tree was blown down and the jackfruit-tree damaged, but beyond this no damage worthy of the name was experienced, and at present everything is looking healthy and well, and plenty of water and grass exists throughout the district.

No especially cold weather was experienced, the lowest point reached by the terrestrial radiation thermometer during the season being 40 degrees F. on the 25th May, 1903.

The unseasonable weather has somewhat reduced the applications for plants and seeds, &c., but little being applied for during the earlier part of the season and the distribution becoming heavier during the latter half.

Applications have been received from all parts of Queensland, Fiji, Samoa, New Guinea, New Hebrides, British Central Africa, Cyprus, and the Southern States, including New Zealand.

The following are the totals of the distributions:—Seed, 1 cwt. 1 qr. 24 lb. 10 oz. Plants, 2,408. Bulbs and rhizomes, 1 cwt. 0 qr. 3 lb. 10 oz. Cuttings, 2,862. Grassroots (mainly *Paspalum dilatatum*), 5,046. Suckers, 814; besides sundry cases of various fruits distributed to hospitals and charitable institutions.

The correspondence is steadily on the increase, amounting to half as much again as last year.

Citrus Fruit Trees.—A small collection of worked citrus-trees was received from the head office, Brisbane, under the advice of the Instructor in Fruit Culture, during the season, consisted of the following:—

2	Plants,	Washington Navel Orange	2	Plants,	Mediterranean Sweet Orange
2	"	Jaffa Orange	2	"	Tahiti Limes.
2	"	Scarlet Mandarin	2	"	Beauty of Glen Retreat Mandarin
2	"	Emperor "	2	"	Valencia late Orange
2	"	Ellendale Beauty (Burgess')	2	"	Variegated Lemon.

These were received on the 17th September, 1902, and planted at once in Field 3, Section II., at a distance of 25 feet apart. The young plants were mulched round and watered during the first three months from planting, which proved a very trying time for them. The ground was kept cultivated and clean until the heavy rains set in, when, finding it was not possible to work the horse over the ground to keep the weeds down, cowpeas were sown to be subsequently ploughed in. In spite of all care, one Scarlet Mandarin and both Beauty of Glen Retreat died. The plants have not made great growth, but those living are in good heart, and it is hoped it will be possible to obtain buds for working into locally-raised stock for distribution before long. In the same orchard were planted also two Blood Shaddock, two Seville Oranges, one Ribbed, and one Yellow Mandarin which are doing well.

Sorghums.—Two rows each of the following ten varieties were sown on the 24th December, 1902; in Field 1, Section II.:—Giant Honduras, Planter's Friend, Early Orange, Amber Saccharatum, Brown Saccharatum, Amber Cane, Collier's, Folger's Early, Early Orange (American variety), and Brown Dhoura.

The Giant Honduras, as usual, beat all others in point of height, amount of green stuff, and amount of crop. This variety seems to be the sorghum, *par excellence*, for the more tropical localities. The average height was about 10 feet.

The two Saccharatums came next, with a height of about 8 feet.

Planter's Friend, also a strong growing variety, averaged 7 feet.

The new American varieties only grew to some 5 feet 6 inches, having but little flag, and being scanty croppers.

MILLETS.—The following are the varieties sown, but as the area available is so limited no reliable return as to yields of either green stuff or grain are recorded:—

Bullrush millet (*Penicillaria spirata sp.*): Seed obtained from South Africa; seed very like a pearl millet; African name, "N'Youti." One row sown on the 24th December in Field 1, Section III., grew very well, and has a heavy flag, but somewhat pithy stalk; average height, 6 feet, and produces a somewhat woolly-looking bullrush-like head, which sometimes attains a circumference of nearly 6 inches. It appears to be a good fodder for stock, cattle and horses being very fond of it.

Raggie (*Eleusine coracana*): An Indian grain; seed obtained from Rhodesia; grain reddish, globular, and small; African name, "U'Poko." One row sown on the 24th December, 1902, in Field 1, Section II., grew very well, taking about four months from sowing to reaping; cropped well; average height, 4 feet; a small narrow leaf, but plenty of flag; stock eat it greedily.

Penicillaria (*Penicillaria spirata, sp.*): Apparently another species of pearl millet, but one that thrives and grows well in the tropics. Not unlike Bullrush millet in growth, but smaller and cleaner head, attaining an average height of 4 feet 6 inches; stands cutting several times, and proves a good fodder; two rows in Field 3, Section II., sown the 16th February, 1903.

Hungarian Millet: One row sown on the 16th February, 1903, in Field 3, Section II. The seed did not germinate well, and, altogether, did not do so well as the foregoing, which seem much better adapted to a tropical climate. Possibly this millet will do better in a different soil and situation. Texas millet and *Panicum miliaceum*, planted on the 16th February, entirely failed to germinate.

COWPEAS AND BEANS.—Two rows of each of the following varieties were sown in Field 1, Section II., on 13th February, 1903:—Large Purple, Speckled, Black, Cream, Small Purple, Yellow, Black Eye, and White's Perennial.

White's Perennial is far ahead of the other varieties in quantity of green stuff per acre and rapidity of covering the ground. It also makes good hay and chaff, but for purposes of dry fodder it is necessary to cut somewhat green, otherwise it has a tendency to drop its leaves. Speckled, sometimes called Brown, and the Black cowpeas came next in utility; the Small Purple and Black Eye proved very poor croppers. Seed of all varieties is available, as also of the three varieties of Mauritius Bean, Black, Mottled, and Green, and the Florida Velvet Bean.

Of ground beans, a variety new to the North was obtained from South Africa, the only name by which it is at present known being the African name of "Indhlubu." One row was sown on the 7th January, 1903, in Field 1, Section II., and has proved very adaptable to the conditions here. The bean produces a heavy crop of almost round beans of various colours, about one-third of an inch in diameter, mostly in single pods, which grow in clusters near the surface of the ground. The plant is not a climber, and has but little growth above ground. The bean requires hilling up like potatoes, and proves to be good eating for man or beast. Would prove a readily-grown and apparently fattening food for stock.

The Pea-nut (*Arachis hypogaea*) grows well, and is a valuable food for pigs. The market for the dried nuts is variable, but in some instances this year it proved valuable as a crop. The oil from the ground-nut would be comparatively easily extracted, and for cooking purposes always commands a market.

The Pigeon Pea (*Cajanus indicus*) proves to have a value approaching the cowpea as a green manure, and is a heavy bearing plant and a good fattening food for poultry.

MAIZE.—Of the six varieties of maize planted in December, the Red Jamaica did well; White Corn, Golden Beauty, Riley's Favourite, and Early Meronie did very poorly; and Cuzco maize failed to germinate.

The soil of the Nursery is not suited to the cultivation of maize or cereals generally, being deficient in humus. It requires deeper cultivation than it is possible to give with a light one-horse plough, and a dressing of farmyard or bulk manures.

SPICES.—A supply of clove seed was received by the Department and forwarded for germination during the year. The seeds of both cloves and nutmegs are of very short vitality; the climatic variations of the season may also have assisted towards the comparative want of success with these. The first supply of seed was received on the 2nd May, and appeared, on being opened, to have started the process of germination either previous to or during transit, and to have been dried—in other words, to have malted. Four hundred and eighty-six were set in boxes in the germinating house, but gave no signs of life. The second consignment of seed was received on the 10th June, from the Seychelles, through the head office of the Department, and was planted (120 seed) on the same day, being set under glass. The seed, on opening, seemed quite fresh, but no signs of germination are as yet apparent.

On the 25th March, 1903, a case of clove plants was received; on being opened, the case appeared to have been opened *en route* and some plants extracted; the remainder appeared damaged by salt water. On being transplanted, the roots were found bent and twisted as if grown in shallow boxes, and the plants thereby stunted.

The seedlings were carefully planted out in pots and boxes and placed in the bush-house, but in spite of great care only six are now living.

Nutmegs.—A consignment of 80 seeds was received on the 3rd May, 1902, and set at once in the germinating house. The seed appeared somewhat dry, but fairly fresh; all failed to germinate, however.

Allspice.—One box of seed of this spice was sown on the 26th September, 1902, and set in the germinating house, but no success was met with. A few plants in pots did not survive the period of shortage of fresh water.

Pepper.—This is not doing well here. Two plants are still living, being planted in the cocoa block. An effort is being made to obtain rooted cuttings for distribution.

Cardamoms.—Only one plant is living, and this suffered during the drought, but it is now doing well. It is expected that it will bear this season.

BANANAS.—The bananas, not doing very well in the field (Field A, Section I.) in which they had been for five years, were this season transplanted into Field 3, Section II., the transplanting being effected on the 19th to 21st January; Field A, Section I., being planted up with *Paspalum dilatatum* grass. The following varieties have adapted themselves to the climatic conditions of the North, and suckers are available:—Moku, New Guinea Sugar, Delena, Barrego, Butter, Dacca, Cavendish, Sugar, Long Plantain, Ladies' Fingers, and also another New Guinea variety, name unknown. Among the bananas, being of the same family, the Manila hemp (*Musa textilis*) is also planted. This is now doing well, and a quantity of suckers are available.

RUBBERS.—Owing to unfavourable season, the rubbers did not grow as well as was expected, and it was deemed advisable not to undertake experiments in tapping this year, especially as such experiments would not have been conclusive unless more or less severe.

Para Rubber (*Hevea brasiliensis*): These trees are now four years old; two bore seed this season for the first time, but only a limited quantity of seed was obtained. It is hoped seed will be available for distribution this year. Number of trees, including seedlings at the Nursery, 61; average height, 23 feet; average girth 1 foot from ground, 16½ inches.

The growth has been fairly satisfactory, and it is hoped several will be large enough to tap in a small way soon.

Central American Rubber (*Castilloa elastica*): A few of these trees blossomed at the age of eighteen months, but did not set the blossoms. Number of trees, 56; average height, 10 feet; average girth at 1 foot from ground, 17½ inches. It is expected that seed of this variety will also be obtainable this year.

Assam Rubber (*Ficus elastica*): This handsome tree of the Banyan family seems particularly adapted to this climate. The three trees at the Nursery are doing well, but, though now some ten years old, do not bear. It is, however, readily reproduced by cuttings, of which any quantity are available.

West African Rubber (*Tabernæmontana crassa*): It being found, as stated last year, that these trees had been planted too far apart in Field 2, Section III., a number were transplanted on the 19th January, 1903, in pits dug diagonally between other rows; 24 trees were then transplanted, of which 6 succumbed; number now living, 48; average height, 12 feet; average girth 1 foot from ground, 9 inches. Owing to the season, these did not bear well this year, but are now blossoming freely. Seed and plants are available. An article dealing with this rubber was submitted for publication during the year in the *Queensland Agricultural Journal*.

COTTON.—The following varieties were received from the Acclimatisation Garden and planted out in Field 3, Section II., on 4th January, 1903:—Eldorado, Truit's, Big Boll, Lewis' Prize, Russell's Big Boll, Matafifi, Sea Island, and also at the same time a variety named Sea Island (*Gossypium barbadense*) from Dr. Thomatis.

These are doing well, and some commencing to bear. Seed, as well as further details as to results, will be available later in the season. Seed of the following were also sown on the 1st July, 1903:—Truit, Jones' Big Boll, Bradly, Parker, Doughty, Culpepper, Christopher, Russell, Seabrook, and another variety from Dr. Thomatis, named Caravonica. These have only recently germinated, and are doing well.

The cotton from four trees of Sea Island cotton, Kidney variety, was weighed in the seed as gathered, 27½ lb. being recorded for the season—average, about 7 lb. per tree. From two trees of Egyptian Upland 12½ lb. were obtained—average, 6¼ lb. These trees have not been pruned, and were in their third year of life when these pickings were taken. Average height of tree, 5 feet, with, however, a very considerable spread.

FODDERS.—An experimental plot for fodder grasses was laid out in Field 2, Section I., in which beds 12 feet square were planted or sown with various grasses. It is intended to record results as to growth, amount of greenstuff per acre, drought-resisting powers, and comparative value, green, as hay and chaff, &c. The following table gives the sowings, &c.:—

Plots.	Name.	Planted or Sown.	Remarks.
1.	Mitchell grass (*Astrebla pectinata*) ...	17-6-02 ...	All died but one stool.
2.	Pentzcke's (*Panicum myurus*) ...	17-6-02 ...	Doing well; cut once.
3.	*Paspalum dilatatum*	17-6-02 ...	,,
4.	Guinea grass (*Panicum maximum*) ...	17-6-02 ...	,,
5.	Cocksfoot grass (*Dactylis glomerata*)...	17-6-02 ...	,,
6.	*Eragrostis pilosa*	17-6-02 ...	,,
7.	*Piptatherum multiflorum* ...	17-6-02 ...	Heavy rain killed seedling.
8.	Russell River (*Paspalum galmarra*) ...	17-6-02 ...	Doing well.
9.	Red Natal (*Panicum teneriffæ*)	17-6-02 ...	,,
10.	Buffalo (*Buchloe dactyloides*) ...	17-6-02 ...	,,
11.	Cannon's grass (*Paspalum platycaule*)	17-6-02 ...	,,
12.	Perennial rye grass (*Lolium perenne*)...	6-4-03 ...	,,
13.	Prairie grass (*Bromus unioloides*) ...	6-4-03 ...	,,
14.	Italian rye (*Lolium italicum*)	6-4-03 ...	,,
15.	Mitchell grass (*Astrebla pectinata*) ...	11-4-03 ...	Failed to germinate.
16.	Cocksfoot grass (*Dactylis glomerata*)...	6-4-03 ...	,,
17.	Sweet-scented Vernal grass (*Anthoxanthum odoratum*)	6-4-03 ...	,,
18.	Timothy grass (*Phleum pratense*) ...	6-4-03 ...	,,
19.	Sainfoin (*Esparcette*)	6-4-03 ...	,,
20.	Red Top grass (*Tricholæna rosea*) ...	6-4-03 ...	,,
21.	Meadow Foxtail (*Alopecurus pratensis*)	6-4-03 ...	,,
22.	Kentucky Blue grass (*Poa pratensis*)	6-4-03 ...	,,

Piptatherum multiflorum.—1 pot sown, 19-3-03, in germinating house, doing well.

MANURIAL EXPERIMENTS.—A portion of Field 3, Section II., was experimented on with manures under the direction of Dr. Maxwell. Lime was first applied at the rate of 3 tons to the acre (10th October, 1902), which was harrowed and then ploughed in, afterwards harrowed again and cross ploughed, then harrowed before the seed was sown.

The following list of cereals were then sown in drills of 54 feet in length—one drill being manured with 1 lb. of the chemical manure supplied from the Mackay Experiment Station by Dr. Maxwell, and one drill without, alternately:—

Rows.	Name.	Average Height. Without Manure. Ft. in.	Average Height. With Manure. Ft. in.	Remarks.
2	Early Orange Cane	5 6	6 0	(Sorghum).
2	Planter's Friend Sorghum ...	6 0	7 0	Noticeably stronger.
2	Giant Honduras Sorghum ...	8 0	9 6	Attacked by birds.
2	Amber Saccharatum Sorghum ...	7 0	8 0	
2	Brown Saccharatum Sorghum ...	7 0	8 0	

Rows.	Name.	Average Height. Without Manure. Ft. in.	With Manure. Ft. in.	Remarks.
2	Amber Cane Sorghum	...	...	Failed to germinate.
2	Coilier Sorghum	5 0	6 0	
2	Folger's Early	5 6	6 0	
2	Early Orange, American ...	6 0	7 0	
2	Coleman's	7 0	8 0	
2	White Kafir Corn	5 0	6 0	Attacked by birds.
2	Hungarian Millet	4 0	4 0	Scarcely any difference.
2	*Penicillaria*	4 6	5 3	
2	Texas Millet	...	...	Failed to germinate.
2	Broom Millet	7 0	8 0	Noticeably better head.

The seed was planted on the 16th February, and crop reaped on 29th June. The quantity was so small as to preclude possibility of recording yields. The difference between the manured and unmanured drills was specially noticeable during the earlier stages of growth, the plants being far more robust and having a far greater percentage of green stuff. The manured rows matured earlier, and the yield was also slightly heavier. The plot chosen carried a very poor soil, and would seem to show better results from the manure after a heavy green manuring or mulching with vegetable matter than after an application of pure lime.

TIMBER TREES (for forestry work).—A number of beds, 5 feet wide by 18 feet long, were made in Field 2, Section II., for raising plants of trees of value in forestry work—

No.	Name.	Seed obtained.	Sown.	Plants available.	Remarks.
1 bed	Carob	Cyprus	2-4-03	260	Germinated well.
2 rows	Teak	Agricultural Department	2-4-03	30	Germinated fairly.
3 beds	Hoop Pine	Forest Department	2-4-03	,,	So far not germinated.
3 beds	Red Cedar	,,	2-4-03	300	Require shading.
3 beds	Cypress Pine	,,	14-4-03	100	,,
1 bed, 2 rows	Black Pine	,,	14-4-03	,,	So far not germinated.
1 bed	Bunya Pine	,,	10-5-02	150	Did not germinate well.
1 box	*Prosopis Stephaniana*	Cyprus	10-6-03	,,	Growing freely.
1 box	Algaroba	Nursery	10-3-03	,,	Very irregular.
3 boxes	Jâk	,,	28-2-03	70	Quantity readily procurable.

Those seeds germinated in boxes, and not at present shown as ready for distribution, are waiting to be planted out into beds. Of the others, only those fit for transplanting are shown as being available.

The mango-trees bore a heavy and good crop this year, the trees apparently benefiting rather than suffering from the dry weather. Yams and root crops, space preventing detailed mention of which, also cropped well during the exceptionally dry weather. *Monstera deliciosa* bore several fruit; and seedlings have been raised from seed and are available. The Ginseng (*Aralia* or *Panax* ginseng), received from the head office on the 13th January, 1903, was set in the germinating house, but so far has shown no signs of vitality. The tree tomato plants succumbed during the drought, and choco also suffered severely. Tree lucerne, of which a few plants were obtained, failed entirely. The Giant Russian and Dwarf Sunflower, on the other hand, did well, as also *Tacca oceanica*, *Schinus Molle*, chicory, teosinte, imphee, and two varieties of bottle-tree, seed of which were newly obtained this season.

Some extension of the irrigation plant was carried out with Nursery labour during the year, every length of piping, standard, and tap being now in use. No damage was done to the pump, though under water during the heavy rains and floods.

The painting of the buildings is becoming urgently necessary to preserve the woodwork; serious repairs may become necessary unless the painting is done before another wet season.

The State Nursery exhibited at the following shows during the year:—Port Douglas, in August, 1902, Cairns, September, 1902; Ingham, September, 1902; Townsville, June, 1903; and Mossman, June, 1903; and the trophies were much appreciated.

The work this year has been heavy, especially as the labour was reduced at end of last season. The energetic and steady work of Mr. J. G. Malcolm, the overseer, is worthy of record.

HOWARD NEWPORT, Manager.

SCHEDULE A.

ABSTRACT OF METEOROLOGICAL OBSERVATIONS FOR YEAR ENDING 30TH JUNE, 1903, TAKEN AT KAMERUNGA STATE NURSERY, CAIRNS. [Readings, 9·20 a.m.]

Thermometer Readings.	1902.						1903.						Totals and Averages.
	July.	Aug.	Sept.	Oct.	Nov.	Dec	Jan.	Feb.	Mch.	Apr.	May.	June.	
Mean Maximum	75·16	77·58	82·03	85·0	85·21	89·16	87·21	88·25	86·09	83·51	80·64	78·28	Mean average maximum, 83·18.
Extreme Maximum ...	79·0	81·0	95·5	93·5	90·0	91·5	101·5	100·5	90·5	92·00	86·0	83·0	Extreme maximum, 101·5.
On Date	31st.	25th.	13th.	27th.	13th.	29th.	7th.	12th.	2nd.	4th.	11th.	25th.	On date, 7th January, 1903.
Mean Minimum	58·69	57·77	56·6	61·74	64·91	70·91	71·54	71·57	71·5	68·86	64·25	62·95	Mean average minimum, 65·11.
Extreme Minimum ...	50·0	50·0	52·0	53·5	56·0	64·0	66·0	68·0	67·5	62·0	50·0	49·0	Extreme minimum, 49·0.
On Date	25th.	25th.	19th.	15th.	9th.	29th.	2nd.	7th.	17th.	16th.	27th.	2nd.	On date, 2nd June, 1903.
Mean Temperature ...	66·92	67·67	69·31	73·38	75·06	80·01	79·39	79·91	78·79	76·19	72·45	70·78	Mean average temperature, 74·16.
Rainfall, Inches	4·000	0·805	Nil.	0·285	1·565	3·785	20·360	10·820	37·4[illegible]0	19·325	2·145	0·500	Total rainfall for 1901-2, 53·892 in.; 1902-3, 101·040 in.
Number of days on which rain fell	14	11	Nil.	5	9	10	17	10	22	25	15	7	Number of days rain fell, 1901-2 139; 1902-3, 145.

SCHEDULE B.

Plants and Seeds Grown and Available for Distribution at Kamerunga State Nursery, Cairns.

Common.	Botanical.	Plants, Seeds, or Cuttings.
Wine Palm	Diplothemium maritimum ...	Plants
West African Oil Palm	Elæis guineensis	Seeds and plants
Cocoanut Palm	Cocos nucifera	,, ,,
Alexandria ,, ...	Ptychosperma Alexandræ ...	,, ,,
Fan ,, ...	Sabal Blackburniana	,, ,,
Areca ,, ...	Areca rubra	
Kentia ,, ...	Kentia monostachya	Seeds and plants
Palm	Cocos plumosa	,, ,,
Date Palm	Phœnix dactylifera	Plants
,, ,, ...	,, rupicola	Seeds and plants
Sugar ,, ...	Arenga saccharifera	
Bastard Sago Palm	Caryota urens	Plants
Para Rubber	Hevea brasiliensis	Cuttings
Ceara ,, ...	Manihot Glaziovii	Seeds and plants
Assam ,, ...	Ficus elastica	Cuttings and plants
African ,, ...	Tabernœmontana crassa ...	Plants
Central American Rubber	Castilloa elastica	Cuttings
Ramie Fibre	Bœhmeria nivea	Plants
Manila Hemp	Musa textilis	,,
Sisal ,, ...	Agave rigida	,,
Fourcroya ,, ...	Fourcroya gigantea	,,
Annatto	Bixa Orellana	Seeds and plants
Seville Orange	Citrus vulgaris	,, ,,
Sweet ,, ...	,, aurantium	,, ,,
Mozambique ,, ...	,, ,, ...	,, ,,
Mandarin ,, (3 vars.)	,, ...	,, ,,
Japanese ,, ...	,, trifoliata	,, ,,
Pomelloe	,, medica	,, ,,
Kumquat	,, japonica	,, ,,
Sweet Lemon	,, medica	,, ,,
Lemon	,, ,, var. limonium	,, ,,
Lime (2 vars.)	,, ,, ,, limetta ..	,, ,,
Washington Navel Orange	,, ...	Plants
Mango (many vars.)	Mangifera indica	Seeds and plants
Sour Sop	Anona muricata	,, ,,
Bullock's Heart	,, reticulata	,, ,,
Cherimoya	,, cherimolia	,, ,,
Star Apple	Chrysophyllum cainito	
Chicory	Cichorium intybus	Roots
Banana (8 vars.)	Musa	Suckers
Mulberry	Morus nigrum	Cuttings
Avocado Pear	Persea gratissima	
Granadilla	Passiflora quadrangularis ...	Seeds
Passion Fruit	,, edulis	,,
Papaw (2 vars.)	Carica papaya	,,
Mangosteen	Garcinia mangostana	
Gamboge Mangosteen	,, cochinchinensis	
Pomegranate	Punica granatum	Seeds and plants
Guava (4 vars.)	Psidium guava	,, ,,
Litchi	Nephelium litchi	
Longan	,, longana	,, ,,
Madagascar Plum	Flacourtia ramontchi	,, ,,
Davidsonian ,, ...	Davidsonia pruriens	,, ,,
Brazilian Cherry	Eugenia uniflora	,, ,,
Vi Apple (2 vars.)	Spondias dulcis...	,, ,,
Fig	Ficus carica	,, ,,
Yung Tau	Averrhoa carambola	,, ,,
Wam Pee	Cookia punctata	,, ,,
Kei Apple	Aberia caffra	,, ,,
Rose ,, ...	Eugenia malaccensis	Plants
Bael Fruit	Ægle marmelos	,,
Pineapples (4 vars.)	...	Suckers
Cape Gooseberry	Physalis peruviana	Seeds
Tamarind	Tamarindus indica	Seeds and plants
Queensland Tamarind	Diploglottis Cunninghamii ...	,, ,,
Carob Bean	Ceratonia siliqua	Plants
Fijian Almond...	Terminalia catappa	Seeds and plants
Bread Fruit (8 vars.)	Artocarpus incisa	Plants
Jack Fruit	,, integrifolia ...	,,
Kola Nut	Sterculia acuminata	
Rosella	Hibiscus sabdariffa	Seeds

SCHEDULE B—*continued*.

PLANTS AND SEEDS GROWN AND AVAILABLE FOR DISTRIBUTION AT KAMERUNGA STATE NURSERY, CAIRNS—*continued*.

Common.	Botanical.	Plants, Seeds, or Cuttings.
Okra or Bandakai	Hibiscus esculentus	Seeds
Tree Tomato	Solanum betacea	
Egg Plant	,, melongena	Seeds and plants
Cassava, Sweet	Manihot aipi	Cuttings
,, Bitter	,, utilissima	,,
Choko	Sechium edule, var. alba	Plants
Sunflower (2 vars.)	Helianthus annuus	Seeds
Ginseng	Aralia ginseng	
Peanut	Arachis hypogæa	Seeds
Horse-radish Tree	Moringa pterygosperma	,,
Pepper	Piper nigrum	
,,	,, methysticum	Cuttings
Vanilla	Vanilla planifolia	,,
Allspice	Myrtus pimenta	
Cinnamon	Cinnamomum zeylanicum	Seeds and plants
Cardamom	Elettaria cardamomum	
Nutmeg	Myristica fragrans	
Cloves	Eugenia caryophyllata	
Anise	Illicium anisatum	
Tea (Assam)	Thea bohea	Seeds
,, (China)	,, chinensis	,,
Cocoa (2 vars.)	Theobroma cacao	Seeds and plants
Coffee (Arabian)	Coffea arabica	,, ,,
,, (Liberian)	,, liberica	,, ,,
,, (Mocha)	C. arabica, var. Mocha	,, ,,
,,	,, ,, ,, Maragogipe	,, ,,
Rice (3 vars.)	Oryza sativa	Seeds
Tobacco (3 vars.)	Nicotiana tabacum	,,
Castor Oil (2 vars.)	Ricinus communis	,,
Black Gram	Cicer arietinum	,,
Pigeon Pea	Cajanus indicus	,,
Coca	Erythroxylon coca	,,
Copal Tree	Hymenæa courbaril	,,
Maté Tea	Ilex paraguayensis	Cuttings
Cotton (12 vars.)	Gossypium arboreum	Seeds
...	Monstera deliciosa	Plants
Creeper	Beaumontia grandiflora	Cuttings
,,	Bignonia venusta	,,
Coralita, Creeper	Antignon amabile	Seeds and plants
Algaroba Bean Tree	Prosopis juliflora	,, ,,
Mesquit ,, ,, (sp.)	Prosopis stephaniana	Plants
Divi-divi	Cæsalpinia coriaria	Seeds and plants
Bermuda Arrowroot	Maranta arundinacea	Rhizomes
Queensland ,,	Canna edulis	,,
New Guinea Arrowroot	Tacca oceanica	,,
Turmeric	Curcuma longa	,,
Jamaica Ginger	Zingiber officinale	,,
Yams (5 vars.)	Dioscorea	Roots and cuttings
Sweet Potatoes (5 vars.)	,,	,, ,,
Red Cedar	Cedrela Toona	Plants
Burmese Teak	Tectona grandis	,,
Knobkerra Wood	Millettia caffra	,,
Millets (vars.)	...	Seed
Striped Bamboo	Bambusa	Cuttings
...	Paspalum dilatatum	Seeds and plants
Grasses (24 vars.)	...	Seeds
Candle Tree	Parmentiera cereifera	Plants
,, Nut	Aleurites moluccana	Seeds
Sorghum and Kafir Corn (10 vars.)	...	,,
Cowpea (10 vars.)	Vigna sinensis	,,
Mauritius Bean (3 vars.)	...	,,
Florida Velvet Bean	...	,,
Sword Bean (2 vars.)	Canavalia ensiformis	,,
Poor Man's Bean	...	,,
Bunya Pine	Araucaria Bidwilli	Plants
Doomba Tree	Calophyllum inophyllum	Seeds and plants
Loquat	Photinia eriobotrya	,, ,,
Madagascar Bean (3 vars.)	...	Seeds
Dwarf Lima ,,	...	,,
Climbing Lima ,,	...	,,
Narico Bean	Dolichos lablat	,,

SCHEDULE B—*continued*.

PLANTS AND SEEDS GROWN AND AVAILABLE FOR DISTRIBUTION AT KAMERUNGA STATE NURSERY, CAIRNS—*continued*.

Common.	Botanical.	Plants, Seeds, or Cuttings.
Bauhinia (and vars.) ...	Bauhinia variegata ...	Seeds and plants
Sappan ...	Cæsalpinia sappan ...	" "
Cassia ...	Cassia grandiflora ...	" "
" ...	" fistula ...	" "
Rain-tree ...	Albizzia saman... ...	" "
...	" stipulata ...	" "
...	Poinciana pulcherrima ...	" "
...	" regia ...	" "
Kafir Boom ...	Hyphœne thebaica ...	" "
Weeping Fig ...	Ficus Benjaminea ...	" "
Indian " ...	" indica ...	Seeds
Cork Oak ...	Quercus suber	
Bean-tree ...	Castanospermum australe ...	Seeds
...	Erythrina phlebocarpa ...	Seeds and plants
...	" indica ...	" "
Jacaranda ...	J. mimosafolia ...	" "
Pepperina ...	Schinus molle ...	Plants

REPORT OF THE INSPECTOR AND VALUATOR UNDER THE SUGAR WORKS GUARANTEE ACTS.

SIR,—I have the honour to submit my Annual Report, for the season 1902, on the operations of the Central mills under "*The Sugar Works Guarantee Acts*, 1893 *to* 1895."

Of the total advances made under the Act—viz., £498,800 8s. 10d.—the sum of £25,794 0s. 9d. has been paid in redemption, leaving the amount now outstanding at £473,006 8s. 1d.

Further temporary advances, however, have been made to the two Government controlled mills—viz., to the Proserpine mill, £5,600; and to the Moreton mill, £3,400. These amounts, added to those previously advanced, make the temporary loans to these two mills £14,100 and £8,700 respectively.

The additional advance to the Proserpine mill provides for 6 miles more of permanent tramway, 50 cane trucks, and the installation of the electric light in the mill and yard, necessitated by the heavy crop to be handled this season. The additional loan to the Moreton mill provides for an extension of the Dulong tramway line for a further distance of 4 miles.

The past season, particularly in the Southern division of the State, has been a very unfavourable one, owing to the severe and continued drought experienced.

The shortage of crop in the South was most serious, as will be gathered from the following crop returns for the past four seasons:—

1899 ...	105,773	tons cane.
1900 ...	45,503	"
1901 ...	60,530	"
1902 ...	9,193	"

From the above it will be seen that a shortage in the Southern crop over that of the previous season was 84·8 per cent.

The Northern central mills, while experiencing almost similar weather relatively to the Southern mills, have not suffered to the same extent. The following crop returns for the past four seasons at our Northern central mills will show that the shortage over that of the previous season only amounted to 17·05 per cent.:—

1899 ...	156,958	tons cane.
1900 ...	174,371	"
1901 ...	201,573	"
1902 ...	167,222	"

The shortage in the cane crop was caused by the extremely dry season, but to the same cause may also be attributed the considerably increased sugar content of the cane, which, in a measure, compensated for the other. The following figures will show to what extent this operated:—

	1901.	1902.
Cane crushed (tons) ...	201,573	167,222
Sugar made " ...	22,637	21,126
Cane, per ton, sugar ...	8·9	7·8

The total tons of cane crushed by our central mills during the 1902 season amounted to 176,415, and the sugar made to 22,045 tons. Of this total the Southern central mills contributed 9,193 tons of cane and 919 tons of sugar, or 5·2 per cent. and 4·1 per cent. respectively.

Statements of expenditure and mill work are attached hereto, and show the effects of the dry season on the Southern mills' finances. The total cost of making a ton of sugar at the Southern mills has been worked out merely to show the relation existing between a full supply of cane and the cost of work.

As regards the Northern mills, it is satisfactory to note that the improvement in mill work still continues. The total cost of making a ton of sugar was reduced from £9 12s. 9¼d. in 1901 to £8 13s. 10¾d. in 1902: a gain of 18s. 10½d. per ton of sugar. The net price paid the grower for cane increased from 14s. 5d. to 14s. 11½d. per ton. The total cost of manufacture—that is, wages, rations, salaries, firewood, mill supplies, and horse feed—was reduced from £1 6s. 9d. per ton of sugar to £1 1s. 7¼d. per ton: a net gain of 5s. 1¾d. per ton of sugar; thus proving that, as these mills reach their capacity, still better results will be obtained.

A glance at the financial results will show that, after providing for Government interest, the profits made by the Northern mills amounted to £24,522 5s. 8d., equal to 8·5 per cent. on the capital invested. In the previous season the profits of the Northern mills amounted to £31,239 17s. 10d., or a decrease of £6,717 12s. 2d., entirely due to the unfavourable season. This is emphasised in the case of the Southern mills, whereas in 1901 they made a profit of £12,474 12s. 2d., the season 1902 ended in a loss of £7,161 14s. 3d.

To the 30th June, 1903, the mills have paid into the Treasury, for interest and redemption, a sum amounting to £10,896 18s. 7d. for the year 1902-3. The total payments from the inception of the mills to the same date amount to—For interest, £73,465 19s. 6d.; and for redemption, £25,795 9s. 1d.; or a total of £99,261 8s. 7d.

Arrears of interest stand at £63,632 1s. 11d., and redemption £26,660 12s. 2d., or a total of £90,292 14s. 1d.

The Mulgrave and Mossman mills, both being in a position to meet their instalments due for redemption, amounting to £3,798 16s. 2d., are holding back these payments pending some decision as to utilising these amounts in lieu of the additional loans promised.

Considerable headway is being made at the two Government controlled mills. The crop at the Proserpine particularly is a good one, and it is estimated that the output of sugar will be close on 3,600 tons, or an increase of 1,500 tons over that of the previous season. The Moreton mill is estimated to turn out 1,500 tons of sugar this season, an increase of 1,200 tons over that of the previous season.

R. W. McCULLOCH,
Government Inspector and Valuator.

PARTICULARS OF MILL WORK, SEASON, 1902.

Particulars.	Marian.	Pleystowe.	Plane Creek.	Proserpine.
Capacity of mill—tons sugar per annum	5,000	6,000	5,000	6,000
Commenced crushing	5 Aug., '02	10 Aug., '02	24 July, '02	13 Aug., '02
Ceased crushing	15 Nov., '02	3 Nov., '02	17 Oct., '02	26 Nov., '02
Hours crushing	1,027·02	746·00	1,035·05	933 02
Hours lost time	...	13·05	245·00	64·00
Tons cane crushed per hour ...	14·08	24·07	17 05	19·01
Tons cane crushed	15,182·06	18,484·00	18,131·00	17,849·00
Tons sugar made 94 n.t. ...	1,732·07	2,070·00	2,265·02	2,035·07
Ditto 88 n.t. ...	1,851·00	2 213·00	2,400·00	2,174·05
Tons cane per ton sugar 88 n.t. ...	8·02	8 03	7 05	8·02
Tons wood ditto 88 n.t. ...	1·02	0·50	0·84	0·70
Average cost of firewood per ton ...	6s. 6¾d.	5s. 6d.	5s. 3¼d.	4s 9d.
Percentages of sugar made, No. 1 ...	85·07	82·07	79·00	74·02
Ditto ditto No. 2 ...	10·06	10·06	19·00	21·03
Ditto ditto x ...	4·04	6·07	2·00	4·05
Average net titres, No. 1	96·77	...	96·15	96·04
Ditto No. 2	95·26	96·36	93·78	85·02
Ditto x	83 35	76·00	81·00	80 09
Average of all sugars	96·11	94·00	95·04	93·03

PARTICULARS OF MILL WORK, SEASON, 1902—*continued.*

Particulars.	Mulgrave.	Mossman.	Gin Gin.	Mt. Bauple.
Capacity of mill—tons sugar per annum	5,000	6,000	4,000	4,000
Commenced crushing	16 July, '02	21 July, '02	19 June, '02	17 July, '02
Ceased crushing	28 Nov., '02	2 Jan., '02	10 July, '02	31 July, '02
Hours crushing	2,409·06	2,375·07	147·02	93·00
Hours lost time	37·09	599·03	27·04	17·00
Tons cane crushed per hour ...	18·06	22·05	14·08	14·03
Tons cane crushed	44,854·04	52,726·02	2,193·00	1,335·00
Tons sugar made 94 n.t. ...	5,422·00	6,268·00	206·00	123·00
Ditto 88 n.t. ...	5,792·00	6,696·00	220·00	131·03
Tons cane per ton sugar 88 n.t. ...	7·07	7·08	9·09	10·01
Tons wood ditto 88 n.t. ...	0·50	0·53	...	1·03
Average cost of firewood per ton ...	6s.	7s. 9d.	4s. 10d.	5s. 5½d.
Percentages of sugar made, No. 1 ...	73·04	...	76·03	72·03
Ditto ditto No. 2 ...	23·08	...	5·07	...
Ditto ditto x ...	2·08	...	18·00	27·07
Average net titres, No. 1	95·58	...	94·08	96·64
Ditto No. 2	92·43	...	92·04	...
Ditto x	76·05	...	80·02	72·35
Average of all sugars	94·32	...	94·04	90·00

Particulars.	Isis.	Moreton.	Nerang.	Totals.
Capacity of mill—tons sugar per annum	4,000	3,000	2,000	50,000
Commenced crushing	22 July, '02	4 Aug., '02	12 Aug., '02	
Ceased crushing	19 Aug., '02	16 Sept., '02	16 Aug., '02	
Hours crushing	239·00	261·00	23·00	
Hours lost time	12·00	50·00	7·00	
Tons cane crushed per hour ...	10·06	11·00	10·00	
Tons cane crushed	2,539·08	2,894·00	236 00	176,417 06
Tons sugar made 94 n.t. ...	229·00	277·06	24·00	20,653·02
Ditto 88 n.t. ...	244·06	297·00	26 00	22,045·04
Tons cane per ton sugar 88 n.t. ...	10·03	9·07	9·08	8·02
Tons wood ditto 88 n.t. ...	0·94	1·07		
Average cost of firewood per ton ...	3s. 9½d.	3s. 9d.		
Percentages of sugar made, No. 1 ...	88·05	87·09		
Ditto ditto No. 2 ...	...	4·06		
Ditto ditto x ...	11·05	7·05		
Average net titres, No. 1	93·91	93·60		
Ditto No. 2	...	88·57		
Ditto x	86·04	76·08		
Average of all sugars	93·06	92·42		

R. W. McCULLOCH,
Government Inspector of Central Mills.

Cost of Manufacture—Season, 1902.

Particulars.	Marian.	Pleystowe.	Plane Creek.	Proserpine.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Salaries (crushing season)	140 0 0	164 0 0	300 0 0	369 18 4
Wages and rations	1,798 13 11	1,580 18 0	1,276 12 11	1,908 3 2
Firewood	608 14 11	276 2 0	468 6 0	362 2 8
Mill supplies	261 8 7	353 9 4	371 1 6	300 15 8
Horse feed...	15 0 0	7 0 4	20 0 0	7 0 0
Total	2,823 17 5	2,381 10 4	2,436 0 5	2,947 19 10
Cane purchased	11,220 3 5	13,869 11 4	13,144 3 0	11,602 3 7
Cane haulage	374 13 11	752 8 0	1,237 13 1	318 3 9
Cane assessment	63 6 2	77 0 4	75 11 0	37 4 3
Total	11,658 3 6	14,698 19 8	14,457 7 1	11,957 11 7
Salaries (off season)	392 9 6	491 0 0	612 17 2	444 15 0
Maintenance charges	1,418 7 2	788 6 11	1,416 17 1	915 10 4
Sugar charges	573 3 3	597 5 0	243 5 1	35 12 6
Office, legal, and printing expenses ...	132 6 1	433 12 8	73 16 0	67 16 9
Insurances	72 11 3	79 3 9	137 1 1	155 0 5
Directors' and auditors' fees	93 0 0	134 8 0	71 0 0	...
General expenses	126 7 6	376 15 2	357 14 11	146 19 3
Government interest	1,460 9 4	1,378 9 8	2,476 6 8	2,126 4 1
Total	4,268 14 1	4,279 1 2	5,388 18 8	3,891 17 4
Grand Total	£18,750 15 0	£21,359 11 2	£22,282 6 2	£18,797 8 9
	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Depreciation written off	2,000 0 0	1 856 14 6	2,964 4 3	...
Average price paid per ton cane ...	0 14 9¾	0 15 0	0 14 6	0 13 0
Average cost haulage	0 0 5¾	0 0 10¾	0 1 3¾	0 0 4¼
Average cost cane at carrier	0 15 4¼	0 15 10¾	0 15 11¼	0 13 4½
Average cost manufacture per ton cane	0 3 8½	0 2 6¾	0 2 8¼	0 3 3½

Particulars.	Marian. 94 N.T.	Marian. 88 N.T.	Pleystowe. 94 N.T.	Pleystowe. 88 N.T.	Plane Creek. 94 N.T.	Plane Creek. 88 N.T.	Proserpine. 94 N.T.	Proserpine. 88 N.T.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Cost of manufacture per ton sugar ...	1 12 7	1 10 6	1 3 0	1 1 6	1 1 6	1 0 1	1 8 11	1 7 1
Cost of cane per ton sugar	6 14 7	6 5 11	7 2 0	6 12 10	6 7 8	5 19 5	5 17 8	5 10 0
Cost of maintenance per ton sugar ...	0 16 4	0 15 4	0 7 7	0 7 1	0 12 6	0 11 8	0 9 0	0 8 5
Cost other charges per ton sugar ...	0 16 0	0 15 0	1 0 5	0 19 1	0 13 2½	0 12 5	0 8 4½	0 7 9¾
Cost Government interest per ton sugar	0 16 10	0 15 9	0 13 3	0 12 5	1 1 10	1 0 8	1 0 10	0 19 6
Total cost of sugar per ton	10 16 6	10 2 7	10 6 4	9 13 0	9 16 9	9 4 1	9 4 8	8 12 11
Average price realised per ton ...	11 1 5	10 7 3	10 14 1	10 0 3	10 10 6¼	9 17 1¼	10 12 9	10 0 0
Profit per ton	0 4 10	0 4 8	0 7 8	0 7 3	0 13 9½	0 13 0½	1 8 1¼	1 7 1
Loss per ton	...	...	...	...	...	...	...	...

Particulars.	Marian.	Pleystowe.	Plane Creek.	Proserpine.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Total profit on season's operations ...	624 17 8	796 11 10	2,003 19 7	2,945 14 8
Total loss on season's operations ...	...	...	...	...
Percentage of profit on capital ...	1·7 per cent.	2·4 per cent.	3·2 per cent.	5·4 per cent.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Total interest paid to 30th June, 1902	10,750 10 9	6,999 3 5	7,113 2 11	...
Total redemption to 30th June, 1902...	3,149 10 11	2,864 12 11	4,190 12 11	...
Arrears of interest to 30th June, 1902	2,730 4 2	4,805 12 3	11,202 5 5	15,543 2 11
Arrears of redemption to 30th June, 1902	659 19 7	1,657 14 11	2,159 10 0	5,274 14 6

Cost of Manufacture—Season, 1902—*continued.*

Particulars.	Mulgrave.	Mossman.	Gin Gin.	Mount Bauple.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Salaries (crushing season)	485 0 0	975 16 8	37 4 5	30 13 5
Wages and rations	3,292 6 3	4,755 13 2	262 7 2	175 8 8
Firewood	1,230 3 5	1,378 9 6	107 7 4	33 12 0
Mill supplies	700 0 0	344 6 1	16 13 4	66 3 0
Horse feed...	38 10 0	30 0 0	...	9 5 8
Total	5,745 19 8	7,484 5 5	423 17 3	315 2 9
Cane purchased	36,082 2 11	39,357 9 4	1,080 9 5	649 2 1
Cane haulage	1,311 10 0	1,736 1 7	106 6 6	142 12 3
Cane assessment	186 17 7	219 16 4	9 2 9	5 11 3
Total	37,580 10 6	41,313 7 3	1,195 18 8	795 5 7
Salaries (off season)	337 10 0	674 3 4	370 1 8	358 1 3
Maintenance charges	3,144 8 5	3,556 3 7	120 13 11	38 5 1
Sugar charges	1,690 12 10	1,206 4 11	74 16 3	102 11 3
Office, legal, and printing expenses ...	276 1 2	163 4 5	21 19 4	32 5 8
Insurances	341 10 2	185 4 10	98 7 10	118 5 9
Directors' and auditors' fees	300 0 0	82 18 4	5 5 0	97 12 0
General expenses	1,152 5 1	1,004 14 6	154 6 3	23 15 6
Government interest	1,723 10 2	2,525 17 2	1,977 1 11	1,237 8 8
Total	8,966 6 10	9,398 11 1	2,822 12 2	2,008 5 2
Grand Total	£52,292 17 0	£58,196 3 9	£4,442 8 1	£3,120 13 6
	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Depreciation written off	3,116 3 6	5,658 3 9	...	1,432 11 0
Average price paid per ton cane ...	0 16 1	0 14 11¼	0 9 10½	0 9 8½
Average cost haulage	0 0 8	0 0 8¾	0 1 0½	0 2 1½
Average cost cane at carrier	0 16 9	0 15 8	0 10 10¾	0 11 11¼
Average cost manufacture per ton cane	0 2 6½	0 2 10	0 3 6	0 4 8½

Particulars.	Mulgrave 94 N.T.	Mulgrave 88 N.T.	Mossman 94 N.T.	Mossman 88 N.T.	Gin Gin 94 N.T.	Gin Gin 88 N.T.	Mount Bauple 94 N.T.	Mount Bauple 88 N.T.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Cost of manufacture per ton sugar ...	1 1 2	0 19 0	1 3 10¾	1 2 4¼	2 1 1¾	1 18 6¼	2 11 2¾	2 8 0¼
Cost of cane per ton sugar ...	6 18 7	6 9 9	6 11 9¾	6 3 4¾	5 16 1¼	5 8 6¼	6 9 7½	6 1 5¾
Cost of maintenance per ton sugar ...	0 11 7	0 10 10	0 11 4¾	0 10 7½	...	...	...	...
Cost other charges per ton sugar ...	0 15 1¼	0 14 1¾	0 10 7	0 9 10¾	...	...	...	...
Cost Government interest per ton sugar	0 6 4	0 5 11	0 8 0½	0 7 6½	...	...	...	...
Total cost of sugar per ton	9 12 11	9 0 7	9 5 8¼	8 13 9¾	21 11 3	20 3 10	25 7 5	23 16 5¼
Average price realised per ton ...	11 1 3	10 7 1	11 2 4	10 8 5	11 5 1	10 10 9½	11 2 4	10 8 9½
Profit per ton	1 8 4½	1 6 6¾	1 16 7¾	1 14 7¼	...	...	...	...
Loss per ton	...	...	...	...	10 6 2½	9 13 9¾	14 5 1	13 7 7¾

Particulars.	Mulgrave.	Mossman.	Gin Gin.	Mount Bauple.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Total profit on season's operations ...	7,691 5 3	10,459 16 8	...	...
Total loss on season's operations ...	...	...	2,163 9 0	1,646 10 8
Percentage of profit on capital ...	14·5 per cent.	14·5 per cent.	...	...
	£ s. d.	£ s. d.		
Total interest paid to 30th June, 1902	12,206 0 7	16,627 5 1	6,914 14 10	4,169 15 8
Total redemption to 30th June, 1902...	2,936 8 2	4,232 5 6	...	508 3 9
Arrears of interest to 30th June, 1902	...	...	8,309 16 0	5,764 2 8
Arrears of redemption to 30th June, 1902	1,556 17 6	2,243 18 8	4,684 0 0	2,664 10 9

Cost of Manufacture—Season, 1902—*continued*.

Particulars.	Isis.	Moreton.	Nerang River.	Totals.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Salaries (crushing season)	124 13 4	110 0 0	10 0 0	...
Wages and rations	247 0 3	311 18 4	64 18 8	...
Firewood	43 15 4	107 12 0	20 5 0	...
Mill supplies	130 13 9	75 6 6	16 8 9	...
Horse feed...	7 10 0	14 6 10	...	...
TOTAL	553 12 8	619 3 8	111 12 5	25,804 10 11
Cane purchased	1,317 14 10	1,485 15 7	153 9 7	...
Cane haulage	234 16 3	175 1 8	33 11 4	...
Cane assessment	10 11 8	6 0 7	0 19 8	...
TOTAL	1.563 2 9	1,666 17 10	188 0 7	137,077 5 0
Salaries (off season)	554 0 0	281 3 0	85 5 0	...
Maintenance charges	128 3 9	362 8 1	72 7 2	...
Sugar charges	85 9 11	142 2 3	8 2 11	...
Office, legal, and printing expenses ...	42 15 6	40 12 11	22 14 4	...
Insurances	88 17 4	70 11 8	45 3 6	...
Directors' and auditors' fees	21 0 0	60 10 0	...	...
General expenses	12 19 0	12 0 2	79 15 7	...
Government interest	1,273 5 8	1,252 1 3	799 19 2	...
TOTAL	2,206 11 2	2,221 8 4	1,113 7 8	46,565 12 8
GRAND TOTAL	£4,323 6 7	£4,507 9 10	£1,413 0 8	£209,447 8 9
	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Depreciation written off	1,880 14 0	...	...	...
Average price paid per ton cane ...	0 10 5½	0 10 3	0 13 0	...
Average cost haulage	0 1 10	0 1 2½	0 2 10	...
Average cost cane at carrier	0 12 3½	0 11 6	0 15 11	...
Average cost manufacture per ton cane	0 4 4¼	0 4 3¼	0 9 5¼	...

Particulars.	Isis. 94 N.T.	Isis. 88 N.T.	Moreton. 94 N.T.	Moreton. 88 N.T.	Nerang River. 94 N.T.	Nerang River. 88 N.T.	Totals. 94 N.T.	Totals. 88 N.T.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d	£ s. d.
Cost of manufacture per ton sugar ...	2 8 4	2 5 3¼	2 4 8½	2 1 8½	4 13 0	4 5 11¾	...	...
Cost of cane per ton sugar	6 16 6	6 10 7¼	6 0 4	5 12 3	7 16 8¼	7 4 7½	...	...
Cost of maintenance per ton sugar ...	...	...	...	...	...	...	...	...
Cost other charges per ton sugar ...	...	...	...	...	...	...	...	...
Cost Government interest per ton sugar	...	...	...	...	...	...	...	...
Total cost of sugar per ton	18 17 7	17 13 8	16 5 5¼	15 3 6¾	58 17 6	54 6 11	...	...
Average price realised per ton ...	11 17 5¼	10 13 0	11 18 4¼	11 2 3½	11 5 0	10 5 1¼	...	...
Profit per ton	...	...	...	...	...	...	...	...
Loss per ton	7 10 1¼	7 0 7¾	4 7 1	4 1 2¾	47 12 6	44 1 9¾	...	...

Particulars.	Isis.	Moreton.	Nerang River.	Totals.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Total profit on season's operations ...	...	...	...	24,522 5 8
Total loss on season's operations ...	1,212 3 0	1,033 2 3	1,106 9 4	7,161 14 3
Percentage of profit on capital ...	...	...	...	...
Total interest paid to 30th June, 1902	7,496 13 9	350 7 4	839 0 0	73,466 14 4
Total redemption to 30th June, 1902...	7,913 6 11	...	...	25,795 1 1
Arrears of interest to 30th June, 1902	625 15 4	8,421 15 0	6,229 8 2	63,632 1 11
Arrears of redemption to 30th June, 1902	565 11 7	3,210 4 8	1,983 10 0	26,660 12 2

NOTE.—In the calculations of "average price realised per ton sugar" and "profit on season's operations," the bonus was taken at £1 2s. per ton. It has since been ascertained that the bonus will be £1 2s. 7½d. per ton 94 N.T. sugar. The profits of the Northern mills will, therefore, be increased by £743 10s. 7d., and the losses at the Southern mills reduced by £26 13s. 7d.

R. W. McCULLOCH,

Government Inspector, Central Mills.

REPORT OF THE INSTRUCTOR IN FRUIT CULTURE TO 30TH JUNE, 1903.

SIR,—The past year, though by no means a favourable one for fruit-growing in many parts of this State, has nevertheless witnessed a considerable increase in the area under cultivation. Extensive plantings of deciduous fruit trees—principally apples, peaches, nectarines, plums, and cherries—have taken place throughout the Stanthorpe district, and to a somewhat smaller extent throughout the colder parts of the State generally. The varieties planted consist largely of those that have already proved their suitability to the districts in which they are to be grown, thus ensuring not only good returns when they come into bearing, but the production of fruit suitable to the requirements of our market.

Citrus culture, despite the losses through drought in some sections, has also been largely extended, many thousands of fresh trees having been planted. The extension in citrus culture is very largely in the direction of planting worked trees of the best varieties rather than seedlings. Only a few varieties are being planted, and those of proved merit. The result of this will be a marked improvement in the quality of our produce when the trees come into bearing, as we shall be able to maintain shipments of high-class fruit, of even quality, which will make and maintain a market in whatever part of the world it may be sent to.

Pineapple culture is extending in many parts of the State, the principal extension being in the Cairns, Rockhampton, Maryborough, North Coast, and Cleveland districts. The quality of the fruit grown has been excellent, and very satisfactory prices have been realised for first-class smooth-leafed pines in the southern markets. The question of canning the common or rough-leafed pines is receiving much more attention, and this method of utilising the surplus during periods of plenty, when there would otherwise be a glut on the market, has tended to maintain prices at a profitable level.

The pineapple industry is one that, as far as Australia is concerned, is practically confined to Queensland, so that we have no competitors to fear in the local trade. At the same time, the pine is a fruit that we can and do grow to perfection, and, given up-to-date methods of utilising the crop when grown, I see no reason why we should not only supply all the requirements of the Commonwealth, but also be able to compete successfully in the markets of the world. During the year I have received many inquiries respecting the canning of pines, and I am glad to say that there is an inclination on the part of our great meat-preserving companies to take up this work in addition to that of meat preservation, provided that growers will agree to produce a sufficient quantity of fruit to warrant their going in for the business on a large scale, so as to reduce the cost of production to a minimum, and to enable them to compete in the markets of the world with a reasonable chance of success.

The crop of deciduous fruit in the Stanthorpe district was a very fair one, despite the dry weather, and prices, though not in some cases equal to those of previous years, were still remunerative. The quality of the fruit grown was equal if not superior to that of previous years, that exhibited at the Stanthorpe show being hard to beat in any part of Australia.

Citrus fruit has not been a good crop, owing to the drought; still that of the North Coast has never been of better quality. The citrus crop of Northern Queensland was a good one, especially in the Cardwell district, though it was not marketed to advantage. The quality of the fruit was excellent, and a consignment of sixty cases sent from Cardwell to Melbourne realised the highest price obtained for seedling oranges during the season. There was practically no loss in this consignment, showing that, given the requisite care in handling, sweating, and packing, our Northern citrus fruit has good carrying qualities. Seville oranges for marmalade-making were in good demand, and consignments from Cairns and Mackay realised satisfactory prices. In my opinion, there is a good market for the Northern fruit both on account of its quality and earliness, and, if the industry is conducted in as business-like a manner as it is now in many of the Southern districts, there should be no difficulty in finding a good market for all the fruit grown, a large part of which has in the past been allowed to go to waste. The citrus crop of 1902, though by no means a good one in the Southern part of the State, was more than sufficient for local requirements, and the action of the Queensland Citrus Growers' Association in disposing of a considerable portion of the crops in the southern markets relieved the local market, thus securing a better price and at the same time maintaining the reputation of our fruits in the southern markets. The work of the association during the year has been of great service to fruit-producers, and fruits other than citrus have been handled. It is to be hoped that the scope of the association will be extended so that not only will fruit-growers be able to find good markets for their produce, but they will be able to obtain all spraying or cyaniding materials, manures, &c., at the lowest rate, thus reducing the cost of production; the object aimed at being to produce fruit of the best quality at the lowest rate, and to market it in such a manner as to leave the largest possible margin of profit to the grower.

Little has been done in the way of export during the year, as Australian markets were capable of utilising the whole of the crop at remunerative rates. The association, however, realise the importance of opening up new markets, and consignments have already been sent to Vancouver and New Zealand, and, as the output of fruit increases, other markets will be exploited.

The citrus crop of 1903, now being disposed of, is a small one, the dry weather, cyclone in the North, and the prevalence of fruit pests (particularly the sucking moth) being responsible for the falling off in yield. Prices have also been far from satisfactory, as, owing to the lateness of our season, our crop has come into direct competition with that of New South Wales instead of preceding it, the combined crops thus overloading the market.

The banana crop in the Southern parts of the State suffered severely from the drought, but plantations have rapidly recovered since the rain, and promise a good yield during the coming spring. The Northern crop was not injured to any extent.

Strawberries were, owing to the dry weather, a failure in many places, but the crop now ripening never looked better, and there is every promise of a record yield.

The question of fighting fruit pests of all kinds has received considerable attention, growers now realising that it does not pay to grow dirty fruit. Cyaniding of citrus and other evergreen fruit trees for scale insects, and the spraying of deciduous trees for scale and other pests, is now the rule and not the exception. Growers now carry out the work themselves, in most cases, with little assistance from the Department of Agriculture; at the same time, wherever instruction has been required, both Mr. Voller and the writer have given it. During the year I have given several practical demonstrations of the best and most approved methods of fighting fruit pests of all kinds in various parts of the State, the instruction so given being much appreciated, and leading in many cases to growers following up the instruction given in a practical manner.

During the year I have also visited most of the principal fruit-growing districts from Wallangarra in the South to Cairns in the North. I have delivered a number of lectures on fruit culture, and have given many practical demonstrations in pruning, budding, grafting, treatment of fruit pests, handling and packing of fruit, &c. At the same time I have given information to a large number of fruit-growers and intending planters on the kinds of fruit to grow, the soil and climate best adapted for particular fruits, the best methods of pruning same, manuring, &c.

The question of irrigation, as applied to orchards and vegetable gardens, has received careful attention, and an article dealing with this subject was written by me for the *Queensland Agricultural Journal*. The importance of securing a supply of water for irrigation purposes during dry spells has been pointed out over and over again, and advice has been given in the erection of many small plants and of the distribution of the water when obtained. Growers realise the necessity of having an available supply of water for irrigation during dry spells, especially during the spring months, as the absence of sufficient moisture in the soil during the setting of the fruit either destroys the crop or lessens it to such an extent as to render it unprofitable. This has been amply proved during the past year, a splendid promise of fruit being ruined through lack of moisture, whereas in cases where water was given a good crop has resulted.

The important question of pineapple culture has been dealt with by me in a series of three articles in the *Agricultural Journal*, and the matter already written will be followed by more on the same subject shortly, the intention being the production of a complete pamphlet on pineapple culture, which will be of value to those now engaged in the industry, as well as being a text-book for those who purpose going in for this branch of fruit culture.

In conclusion, I may state that, though the industry has passed through a very trying time, it has continued to make steady progress, and I feel that my work amongst the fruit-growers of this State is appreciated by them, and is producing tangible results which are of benefit to the State at large.

It is in the practical side of my work, whether same be in the pruning of the trees, the treatment of disease, or in the handling and packing of the fruit, that I have obtained the best results, as this appeals directly to those who are making their living by fruit-growing, actual results speaking more forcibly than any theoretical instruction.

It is pleasing to note that the appreciation of the results of the work of the fruit branch of this Department is recognised outside the State, as instanced by the remarks of Mr. T. Jessop, M.L.A., the president of the Sydney Fruit Exchange, and a gentleman who has had a life-long experience in the handling of all kinds of fruit. Mr. Jesson visited Brisbane in May last, and in the course of an interview with the reporter of a Brisbane daily made the following statement:—"I have to congratulate your fruit-growers on their excellent productions. I should say that the citrus fruit of Queensland could not now be easily beaten. From all districts come excellent samples, all much superior to what is produced in New South Wales. It is plain that your orchardists are taking more pains in their business, paying more attention than before to the fumigation of trees and cleaning of fruits for the market. I am surprised at the Queensland pineapple crop for the present year. It exceeds the output for any previous season, and I am glad to hear that preserving factories are being brought equal to the occasion. I wish chiefly to emphasise my admiration for Queensland citrus fruits."

Testimony like this is extremely gratifying, and proves that the fruit branch of this Department is recognised outside the State as having done good work for the fruit-growers of this State.

A. H. BENSON,
Instructor in Fruit Culture.

REPORT OF THE INSTRUCTOR IN COFFEE CULTURE, Etc.

Sir,—I have the honour to submit my report for the year ending 30th June, 1903.

As my position as a responsible officer of the Department, entirely resident in the tropical portion of the State, necessitates a somewhat wide range of work covering several branches of agriculture, and does not permit of my confining myself, as was at first anticipated, to work in connection with coffee culture, I am including in this report short references to such other duties as can be grouped under distinct headings. Indeed, during the past year no inconsiderable portion of my time has been occupied with such matters, of importance themselves in tropical agriculture, but which cannot be included under the one heading of "coffee culture."

The scope of the Department is steadily increasing in the North, and the necessity for due consideration to agricultural matters is becoming increasingly evident—matters that often require special treatment, owing to the great climatic difference between the Northern and the other districts of the State.

Coffee Culture.—The season for coffee has this year been somewhat trying, owing largely to the extreme meteorological variation experienced during the first half of the season, when the conditions of drought, already severely felt during the previous season, continued and increased in severity until the close of the calendar year, and also the latter half of the season, when heavy rains amounted to almost an equal extreme, showing a fall within six months or so almost equal to the average for the past ten years.

The excessively dry time in the earlier part of the season referred to had the effect in several instances of making the coffee droop, and in a few cases of burning off blossom—a thing previously unknown. The effect throughout the country has been to make the crop considerably later than usual. The subsequent heavy wet season has induced a heavy flushing or growth of leaf and wood, but altogether, while somewhat trying, but little harm has been done.

Fair to good crops have been obtained generally, as was anticipated, especially on estates that have received attention in weeding, and prospects are for a really heavy crop in the coming season.

The dry season also had the effect of retarding the growth of trees, which in the case of badly-planted estates has resulted in good rather than harm, the condition of the trees, after the enforced rest, being remarkably fine.

The sample of berry, which last season was small owing to the continued shortage of rainfall, is, this year, very much larger, and will undoubtedly obtain better prices in consequence, especially when better attention is given to curing.

No frosts were experienced this season, and estates that were affected last year have recovered, the trees being almost as large and bearing even more heavily than before they were so unfortunately frost-bitten. The continued drought, especially after the damage by frost, has resulted, as anticipated in last year's report, in the dropping out of several small growers and the abandonment of their small areas, in which places the coffee-trees, though by no means killed out, are now almost past recovery from neglect and weeds.

I was pleased to note in many directions adoption of improved methods, and greater attention to culture and field work as well as curing, and in some cases the satisfactory overcoming of little difficulties in the direction of labour for picking and other matters showed resourcefulness and self-reliance on the part of some of the pioneers of the industry.

The matter of reducing the cost of production to the lowest possible point by attention to details both in field and store work is not yet receiving the attention from growers that I should like to see. As growers begin to appreciate the importance of this matter and exercise due economy in time and labour, there is no doubt they will find, not only that it makes often all the difference in amount of profits, but settles most of the vexed questions assailing the planter.

The greater number of inquiries for advice and information this season have, however, been in the direction of curing and disposing of crops.

The smaller growers have complained of a difficulty in obtaining a ready market, owing to the reduced demand by the smaller local produce merchants to whom they had hitherto been able to dispose of their small lots, the merchants explaining that the abolition of the duty on tea has so widened the difference in price between the beverages as to show an appreciable reduction in the consumption of coffee. The reimposition of the duty on tea being impracticable, a bonus on the coffee produced in the Commonwealth, as petitioned for by the Coffee Growers' Association, even if considerably less than the amount stated by them, would undoubtedly largely meet the case. Nor need it be feared that such assistance would not benefit the growers, but be taken advantage of by speculators—in other words, the produce merchants—who now buy direct from the producer, if the growers will go to the open markets of the Commonwealth, as in Sydney and Melbourne.

The total amount of such assistance would be but trifling, and, in any case, is not to be compared to the advantage to the Commonwealth of fostering, encouraging, and, in fact, establishing so advantageous an industry.

The obvious remedy for the present low prices offered within the State for the raw product, apart from co-operation and organisation were it practicable, is in the further treatment of the coffee by hulling and grading as pointed out in last year's report and in my report submitted after visiting the southern States for this especial purpose. This curing can be done by each individual grower with hand-power machines of cheap cost. (*Vide Queensland Agricultural Journal*, "Coffee Machinery," June, 1902.)

Acting on my advice, several growers have so cured their crops this season, and despatched them to Sydney for sale by auction by brokers; the coffee being dealt with in the same manner as tea, with very gratifying results. The cost of sending the crops to Sydney amounts to no more than in shipping to Brisbane, and the freight and charges amounted to less than ½d. per lb. The prices obtained were not the highest possible by any means, but were good, and taking into consideration the fact of the small size of the sample, largely due to the drought, and the fact of this being in most cases the first consignment, the prices were gratifying and the sales prompt. Accordingly as care is taken in curing, *i.e.*, thorough drying after pulping, hulling, and grading, packing in double bags, not more than 70 lb. in a bag, branding and marking (for neatness of packing is just as important a point in coffee as in any other line of produce), the quality is recognised as being uniform and reliable, and the brand becomes known, so will the confidence of the buyers be obtained and the prompt and ready sale of each grower's crop, be the quantity large or small, be assured and prompt.

With an industry capable of extension to twenty times its present size before any grave consideration need be given to exportation, no fear need be entertained regarding the advisability of the cultivation of coffee in the Commonwealth on account of the apparent surplus in the world's supply of low-grade coffees as would seem to be entertained in some quarters.

With attention to what may seem small items of field and store work, adoption of practical and approved methods, all of which lead to reduction in cost of production, which cannot be too much emphasised, and due attention to curing, &c., the prospect for coffee-growers in Queensland are very distinctly favourable.

The tour through the coffee-growing centres in the Southern part of the State, usually undertaken during the earlier part of each season, was this year abandoned through the necessity for retrenchment, and therefore the districts of Rockhampton, Yeppoon, Byfield, Tungamul, Percy Island, Maryborough, Pialba, Mount Buderim, and Maroochie River were not visited. It is proposed to visit these places this season, however. The touring for instruction and demonstration has been therefore confined to the North—between Mackay and Cooktown; the only places not visited this season being the Bloomfield River and Geraldton. In all, seventeen tours were undertaken, aggregating 117 days.

The amount of correspondence, including applications for information, advice, and visits, &c., has been about the same as last season. One article entitled "Staking" has been published in the *Queensland Agricultural Journal* for August, 1902. It is to be regretted that the general work in the North, especially while single-handed in the office, does not admit of more time being devoted to the writing of such articles for the *Journal*.

Diseases in Plants Act.—The inspections of export and import fruit, plants, seeds, &c., at the port of Cairns has been carried out thoroughly during the season.

The examination of exports is by far the greater work, but the imports are none the less important, especially now that coffee leaf disease has been found in New Guinea, and importations of all plants from thence prohibited by special regulations, the Northern ports being the nearest and most frequently in direct communication with New Guinea, and the principal seat of the coffee industry being in North Queensland.

In the matter of exports, bananas have somewhat decreased this season, and pines increased. The decrease of bananas exported may be put down to the effect of floods over some of the most productive gardens along the Cairns-Mulgrave tramline and the abandonment of gardens in the Barron district.

This decrease will be more than made up shortly by the coming into bearing of considerable areas now tapped by the Cairns-Mulgrave tramway extension. Bananas are also being planted to some extent in the Port Douglas district—notably the Daintree—where some considerable exportation to the South Queensland and the southern States may be anticipated as soon as communication is arranged with the port. The export of fruit from small ports, both north and south of Cairns, shows signs of increasing, and arrangements for due inspection will have to be made should this happen.

The orange crop, especially of mandarins, is poor this year in the North, on account of the unfavourable season; but it may be anticipated that a notable reduction in damage from fruit fly will be the result next season.

The Diseases in Plants Inspector at Cairns is supplied with a spraying outfit as well as a small tent for fumigating. A certain amount of work in this direction, as well as giving demonstrations of pruning of citrus trees, has been carried out during the year, and the energetic work and interest displayed in it by Mr. Drummond Macpherson is to be commended.

To garden inspections the inspector has been assiduous in devoting any time not actually required on the wharf, to the very apparent advantage of citrus culture in the district.

Citrus fruit culture is on the increase in the vicinity of Cairns, as well as about Atherton and the Mossman, and it is hoped that since the situation of these districts in the North prohibits the direct attention of the instructor in fruit culture himself, except at considerable intervals, it will be possible for the inspector to devote more time and attention to fumigating, spraying, pruning, and general advice in citrus fruit culture upon any lines that may be approved by Mr. Benson. Such work, when coupled with an inspection having as an object the reduction of fruit fly, scale, and other pests, is urgently required in many outlying orchards, and would prove of inestimable benefit to settlers.

Wild guava and deserted banana gardens and orangeries continue to be the one great difficulty in the fight against insect pests, and no ready solution of it seems likely to be forthcoming.

The Kamerunga State Nursery.—Conducting the work of this Nursery constitutes a very considerable portion of my work in connection with the Department of Agriculture in North Queensland. As a separate report is submitted dealing with the work of the Nursery, in order to come into line with the other more or less similar nstitutions, it would be out of place to go into details in this report.

The special work of the Nursery—in acclimatising and propagating imported and propagating and improving indigenous plants, trees, and shrubs of economic value, and in distributing them to agriculturists, horticulturists, pastoralists, and settlers generally, and in experimenting with economic products of all kinds—is in itself an extensive work. The popularity of the institution has largely increased, and is evidenced by the increasing number of farmers and others who visit the Nursery to see the various experimental plots and obtain seed, plants, and cuttings, as also by the steadily increasing correspondence.

The utility of the work and practical experiments in economic products are admitted on all sides, communications reaching this office from various parts of the Empire.

The attending and exhibiting at agricultural shows in various centres of the North is a considerable feature in the work of the institution, which is not only very much appreciated, but is showing practical and good results.

Re-afforestation Work.—During the season some re-afforestation work was undertaken at the instance of the Inspector of Forests and under the direction of the Under Secretary of the Department of Public Lands.

In March of this year I proceeded to Atherton, and inaugurated the work of transplanting young cedar plants from the scrubs adjacent to Atherton into the Forest Reserve at Carrington. Young plants from 1 foot to 2 feet high were chosen and replanted in the reserve along the old timber tracks which intersect it, the transplanting being effected with gratifying success.

The number of young cedars thus planted amounted to 1,536, at a gross cost of £25 3s. 6d., and a net rate, exclusive of certain unavoidable initial expenses such as purchase of tools, of some 25s. per 100. Credit is due to Mr. W. Stovell, to whom the work was intrusted, for conscientious work under somewhat trying climatic conditions.

The sum granted was very small, so that the whole work may be considered more as an experimental step than the inauguration of any general scheme of re-afforestation. It is, however, hoped that it is only the first step leading to more or less extensive planting out by the Forest Department of trees of value, both in the direction of timber and general forest produce.

The value to the State of such work can only be roughly computed, but at present values, which there is no reason to suppose will decrease as the supply is being gradually exhausted, and considering the rate of growth of this class of timber, it may, I think, safely be estimated that, even allowing for failures, &c., within, for the State, the comparatively short period of fifty years or so, the cedars now planted will show a return value approaching 200 times the amount of original outlay.

As an experiment, so far as it has gone, the work already done may be considered a distinct success, and it is trusted that it will be deemed at least sufficiently conclusive to warrant the consideration of the advisability of more extensive operations in the same direction by the Forest Department.

Besides trees actually planted out, seeds of various valuable trees have been received through the officers of the Forest Department and germinated at the Kamerunga Nursery, among which may be mentioned—Red cedar (*Cedrela Toona*), hoop pine (*Araucaria Cunninghamii*), cypress pine (*Callitris robusta*), black pine (*Podocarpus pedunculata*), and Bunya pine (*A. Bidwillii*). From other quarters seeds of trees of value for purposes of forestry have also been received and successfully germinated, such as the carob (*Ceratonia siliqua*), Burmese teak (*Tectona grandis*), the Algaroba (*Prosopis juliflora*), Mesquit bean-tree sp. (*P. Stephaniana*), Jâk-tree (*Artocarpus integrifolia*), Moreton Bay chestnut (*Catanospermum australe*), Doomba-tree (*Calophyllum inophyllum*) and bottle-trees (*Sterculia sp.*).

Several of the latter have a high value as fodder, as well as timber trees, and some have the faculty of thriving, not merely upon poor forest soils, but under conditions of but scanty rainfall, a direction in which wide scope exists for particularly valuable work by this department.

Plants of all the trees mentioned are in greater or less quantity already available, and can be transported with facility to any desired spot, while plants in any desired quantity could readily be raised should they be required.

HOWARD NEWPORT, Instructor in Coffee Culture.

REPORT OF THE TOBACCO EXPERT.

Sir,—I herewith submit report of work done at the Experimental Tobacco Farm at Texas for the year ending 30th June, 1903.

It was intended to plant between 14 and 16 acres in tobacco, but, on account of the continued drought, only a scattering stand could be obtained in the fields, from which we have harvested something near 2 tons of fairly good and serviceable tobacco.

The value of the experiments for the prevention of blue mould in the seed beds cannot be determined, as the atmospheric conditions that usually prevail to produce the disease were absent the past year, and hence the disease did not manifest itself in any part of tobacco-growing districts.

We planted six of the very best and most approved varieties of tobacco to determine which was the most desirable for our soils and climate. These were Lax, Blue Pryor, Yellow Pryor, Heston, Conqueror, and Burley. I am not fully satisfied with the results, as the drought also made the experiments inconclusive.

Of these varieties, the Lax proved by far the hardiest, or most drought-resisting—in fact, the only one from which we succeeded in getting much yield. This tobacco is a good grower, maintains its type stubbornly, and yields and cures well, and is a favourite tobacco in both Kentucky and Virginia.

The Burley stood next best, but, unfortunately, being a sport, has a strong tendency to revert to the original type. Will try it again. Of the others only a few plants survived the hot winds, and of the Yellow Pryor only one plant survived. I shall try another variety the coming year.

I also had a few plants of native tobacco, but I doubt if it has any value.

There are also a few plants of Transvaal tobacco, but they perished by the hot winds. It has also been the aim of the farm to demonstrate that tobacco can be grown at a profit by the white farmer. I have employed none but white men on the farm, at good wages, and the first two years' returns show that, notwithstanding the drought with which we have had to contend, we only lack £27 16s. 5d. of having paid actual working expenses; and off this, if we can deduct the plant-bed, framing, and covering, and the tobacco screw, which are largely permanent investments, and the amount we have had to pay for horsefeed on account of drought, we would be something like £50 to the good.

Besides, we have greatly added to the value of the property, by getting other ground ready for the plough, which will be in cultivation the coming year.

In conclusion, I may say that the work of the farm has demonstrated that the white farmer can grow tobacco profitably, and the small farmers are manifesting an interest in it by reason of these results.

R. S. NEVILL, Tobacco Expert.

REPORT OF THE VITICULTURIST.

SIR,—I have the honour to report upon my work for the past twelve months as follows:—

Notwithstanding the serious effects of the past year's drought on many vineyards, a considerable and growing interest is being shown in this branch of fruit culture, and my time has been fully occupied in visiting vignerons in all districts of the Southern part of the State to advise on choice of soil, varieties to plant, pruning of same, &c. I have also given part of my time to the State vineyards, about which I have to report as follows:—

WESTBROOK VINEYARD.—The new varieties imported from Europe three years ago came into bearing for the first time this season, but the long drought affected them so adversely, and the fruit was so meagre in quantity and poor in quality that I am unable to make any reliable report upon their merits this year. Moreover, the dryness of the season prevented any development of fungus diseases on vines. On this point, observation as to their liability or resistance to the same is very necessary before a vine could be recommended for distribution. For this reason I will defer making any report as to their merits or defects until next year. To judge from some of the grapes grown under such adverse circumstances, there are several valuable additions to our collection of table and wine grapes among them.

I made further observations during the season upon the drought resistance of the phylloxera resistant vines imported from France, which practically confirm those of last year. The order of resistance was as follows:—

1. Aramon x Rup Gauzin No. 1.
2. Mourvedre x Rup 1202.
3. Rip x Rup 3309.
4. Rip x Rup 10114.
5. Rupestris Martin.
6. Rip x Solonis 1616.
7. Rup Forthworth.
8. Riparia Gloire.

The continued drought seriously affected the crop of grapes, which was practically nil on many varieties. Some of the table grapes had a fairly good crop, especially Muscat of Alexandria, but, unfortunately, a heavy fall of hail destroyed two-thirds of the bunches and badly damaged the remainder. The returns from the vineyard were therefore very small. With a good season and the new vineyard coming into full bearing there should be a heavy crop this coming year. The results of the drought on the vines at Westbrook show that in this class of soil (heavy chocolate, of basaltic origin) the varieties most affected are—Mataro, Mavzac—Riesling. Those least affected were the Black and White Hermitage and Clairette. Muscat Hamburg suffered, but the Muscat of Alexandria did not.

HERMITAGE VINEYARD.—For the third time hail destroyed the crop from these vines, consequently there was no return from it. This vineyard requires to be replanted with the varieties adapted to the district. Those planted in the first instance are mostly unsuitable to the Downs country and will, in my opinion, never do well there.

GATTON COLLEGE.—Considering the season, there was a promise of a good crop of table grapes from the vines near the creek, but a hailstorm, unfortunately, ruined it utterly. The vineyard near the College buildings suffered rather severely from the drought, and a number of vines have died in consequence.

BIGGENDEN VINEYARD.—This vineyard stood the drought better than the others, and had, for the season, a fairly good crop. The wood this year is strong, and shows that the vines suffered less than was to be expected. The vineyard at this experimental farm is an object of interest to the farmers of all the surrounding districts. I have invariably a large and appreciative attendance when pruning the vines and doing other work on them, and there is no doubt that the establishment of this vineyard will have the effect of considerably increasing the culture of table grapes in this locality, numerous applications for vine cuttings having already been made.

GENERAL REMARKS.—The disastrous drought of the past year destroyed the crop from grape vines like that from all other fruit trees, except where they had been planted on deep, moist, sandy soils, the fortunate owners of which reaped a fine harvest, as the prices of grapes of all kinds ruled high this season. In consequence the returns of the past year, both for fresh grapes and for wine, will be very seriously reduced. It is to be feared that the coming crop will, in many localities, be a very light one, as the pruning wood will, in the majority of cases, be found to be spindley and wanting in fruit-bearing eyes; the effects of the drought will be felt for at least another year. In the Roma district, the past year, coming on top of five other very dry seasons, gave the *coup de grâce* to old vineyards and those which had been weakened by over-production. It may be estimated that upwards of 50 per cent. of the vines about Roma are dead or dying and will have to be replanted. Some of the growers are hesitating about doing so, as they fear that the demand for wine and other grapes will in the future be a diminishing one. Grapes of approved varieties will always find a sale, but they must be the best; it will be a waste of time to replant with Mataro or Black Cluster, Clairette, and other big croppers. Experience has shown that the vine has proved to be the farmers' friend about Roma.

E. H. RAINFORD.

REPORT OF THE COLONIAL BOTANIST.

SIR,—I have the honour to submit the following brief summary report of the work appertaining to the office of Colonial Botanist for the past year.

The usual number of personal calls and written applications have been made by persons in quest of information regarding the classification, as well as the cultivation of plants, proving that the interest taken in these branches of knowledge by a considerable portion of the public is by no means diminishing.

The museum of economic botany has proved of value to a number of persons who have visited it in the course of their various professions or callings. This portion of a botanist's work, which is of so much practical use to so many, has been but very slightly increased by exhibits, owing to the want of funds to furnish cases to place additional exhibits in.

The herbarium has been constantly but slowly added to both by exotic and Australian specimens, and here again much inconvenience and loss has occurred from the want of additional cabinets for the specimens.

A few days spent by my assistant collecting seeds of indigenous grasses furnished enough to make up packets for a few correspondents, but, to have furnished anything like representative examples of our grasses, a collector would have to be constantly in the field, and travel far and wide, so as to be able to hit upon the exact time when the seed was ripening.

With regard to noxious weeds and poisonous plants, few of this character reached me during the drought, the information then sought by country correspondents being rather if grasses or other plants could be sent to them that would furnish food for stock independent of rain or moisture. It is well known that plants receive their food in a liquid or gaseous state; therefore, without such supplies no growth must be expected. However, since the rains started grasses and many other plants have sprung up, some of which, owing to their uncommon rank growth, were thought by many to be new to the flora and were sent to me for identification, but in most cases they proved to be only strong growths of the former inhabitants of the country.

Among those sent as suspected poison-plants very few proved to be of a poisonous or deleterious character. The additional fungus blights for the year are given in a botanical bulletin now in the press.

The publications were the 6th and last part of the Queensland Flora, which was issued in December last, and for which I have received very flattering notices in botanical publications and by fellow-botanists both within and beyond the Commonwealth.

I have kept the expenses of the library down to the sum (£10) which was allowed for carrying on periodicals, a sum altogether too small for the work. When first appointed, £50 per annum was allowed to the purpose, which, although small for the object for which it was granted, enabled me, by judicious expenditure, to get together a fair nucleus of a botanic library, and I trust that a like sum may soon be again allowed for carrying on this much-needed work.

My assistant has, as usual, paid weekly visits during the year to the Agricultural College for the purpose of giving botanical lectures to the students.

F. MANSON BAILEY, Colonial Botanist.

REPORT OF THE ENTOMOLOGIST AND VEGETABLE PATHOLOGIST.

INTRODUCTORY.

The services of the Entomologist and Vegetable Pathologist have, in 1902-3, as compared with what has occurred in past years, been in equal request, even if greater public demand has not been made upon them during this period. The drought that obtained during the earlier portion of the time embraced in this report determined the presence in examples of almost all cultivated plants, both those of field and orchard, of constitutional derangements; and these conduced not only to the subsequent inroads of specific diseases, but to the incursions and attacks of injurious insects also. For, with the recurrence of normal climatic conditions, animal life of this class became unusually prevalent, with the result that much damage accrued to fruit—for instance, from the operations of sucking moths (*Ophiderinæ*) and other equally notorious pests—and to field crops and pasturage from the successive visitations of caterpillars and grasshoppers. Moreover, some of our native insects, through being temporarily deprived of their usual food plants, manifested during the year harmful relations to cultivated naturalised ones, previously unremarked. Thus not only have special urgent inquiries been presented, but novel investigations entered upon in number far in excess of what has been usual. The insect life thus conspicuously prevalent has, too, experienced, to a lesser degree than is ordinarily the case, the checks usually exerted by our feathered friends; drought, as well as the exercise of the growing propensity for bird destruction on the part of our colonial youth, having operated in effecting a great diminishment in their numbers.

As evidence in support of the facts thus generally described, it may be mentioned that, in addition to the information that has emanated from this office relating to questions concerning plant pathology and agronomic entomology on the occasion of personal interviews on the part of those interested, the following, amongst other topics embraced in the same departments of knowledge, have formed objects of written communication and report:—

CORRESPONDENCE AND REPORTS.

I.—ECONOMIC ENTOMOLOGY.

APPLE.—Pernicious Scale Insect (*Aspidiotus perniciosus*), Toowoomba, Tenterfield, and Brisbane; Codling Moth (*Carpocapsa pomonella*), Stanthorpe and Tenterfield; Scarlet Mite (*Bryobia sp.*), Stanthorpe; Shoot-puncturing Insect, Stanthorpe.

PEAR.—Greedy Scale Insect (*Aspidiotus cameliæ*), Toowoomba; Fruit Fly (*Tephritis Tryoni*), Warwick; Sucking Moths (*Ophiderinæ*), Yandina.

Peach.—Pernicious Scale Insect (*Aspidiotus perniciosus*), Darling Downs, Brisbane, and Raglan; Ripe-fruit-damaging Beetle (*Glyciphila brunneipes*), Brisbane; Parlatoria Scale Insect (*Parlatoria proteus*), Brisbane.

Plum.—San José Scale Insect (*Aspidiotus perniciosus*), Brisbane; Parlatoria Scale Insect (*Parlatoria proteus*), Brisbane; Scarlet Mite (*Bryobia sp.*), Darling Downs.

Fig.—Fruit-frequenting Beetle (*Cetonia atomaria*, Fabr.), Brisbane; Fruit-frequenting Beetle (*Brachypeplus binotatus*), Cleveland.

Loquat.—Greedy Scale Insect (*Aspidiotus cameliæ*), Brisbane.

Orange (and other Citraceous Plants).—Sucking Moths (*Ophiderinæ*—*Ophideres fullonica* and *Mœnas salaminia*), Blackall Ranges, Yandina, Burrum River district, &c.; Fruit-eating Caterpillar (*Papilio erectheus*), Gympie; Fruit Mining Caterpillar (*Conogethes punctiferalis*), Brisbane; Fruit-eating Caterpillar (*Bombycidæ* gen. et sp. in-det.), Gympie; Wood-boring Beetle (*Urocanthus Cryptophagus*), Coomera; Leaf-gauging Beetle (*Prosayleus phytolymus*, Olf.), Buderim Mountain; Leaf-eating Beetle (*Monolepta rosea*), Rockhampton; Green Fruit Plant Bug (*Biprorulus bibax*, Breddin), North Coast Line and Sunnybank; Bronze Plant Bug (*Oncoscelis sulciventris*), Toowoomba; Phytopus Mite (*Phytopus oleivorus*), Palmwoods and Maryborough; Scarlet Fruit Mite (*Brevipalpus sp.*), Buderim Mountain; Fungus-eating Mite (*Leiosoma sp.*), Redland Bay; Circular Black Scale Insect (*Aspidiotus ficus*), Maryborough and Oxley; Black Scale Insect (*Lecanium oleæ*), Toowoomba; Circular Red Scale Insect (*Aspidiotus coccineus*), Cardwell, Gladstone, Gympie, Nambour, &c.; White Scale Insect (*Chionaspis citri*), Cardwell, Gladstone, Ipswich, Brisbane, &c.; Pale Circular Scale Insect (*Aspidiotus lataniæ*), Cardwell; Glover Scale Insect (*Mytilaspis gloveri*), Gladstone and Brisbane; Fulvous Mussel Scale (*Mytilaspis fulva* = *M. citricola*), Brisbane, Cleveland, and North Coast Line.

Mango.—Fruit Fly Maggot (*Tephritis Tryoni*), Brisbane; Purple Wax Scale (*Ceroplastes rubens*), Brisbane and Cleveland; Fruit Weevil (*Crytorynchus mangiferæ*), Brisbane; Fruit-sucking Moths (*Ophideres fullonica*), Brisbane.

Paw-Paw, Persimmon.—Fruit-sucking Moths (*Ophideres fullonica*, &c.), Yandina.

Custard Apple.—Fruit-boring Caterpillar (*Conogethes punctiferalis*), Zillmere.

Grapes.—Wood-boring Beetle (*Orthorrhinus cylindrirostris*), Brisbane and Biggenden; Fruit-sucking Moths (*Ophideres fullonica*, &c.), Brisbane and Bundaberg; Termites, or White Ants, Beebo and Roma; Fruit Fly Maggot (*Tephritis Tryoni*), Brisbane.

Coffee.—Polydesmid myriapod (*Haplosomidæ*)—presence, however, not significant of injury, Daintree River.

Cocoanut.—Foliage destruction, erroneously attributed to a cicada, Rattlesnake Island.

Strawberry.—Leaf-eating Beetle (*Diphucephala sp.*), Palmwoods; Plant Louse or Aphis, Woombye; Fruit-eating Beetle (Fam. *Nitidularidæ*), Wellington Point.

Cotton.—Banks' Shield Plant Bug (*Tectacoris Banksii*), Cairns, Mackay, and Biggenden.

Potato.—Tuber-gnawing Millipede, Palmwoods; Potato Moth Borer (*Gelechia operculella* = *Lita solanella*), Coomera; Tuber-gauger (*Isodon puncticollis*, Fam. *Scarabæidæ*), Brisbane.

Sweet Potato.—Sweet Potato Weevil (*Cylas formicarius*), Bowen and Beenleigh.

Beans.—Bean Fly Maggot (*Agromyza phaseoli*), Brisbane, Wynnum, &c.; Bean Aphis (*Aphis rumicis* ?), Brisbane.

COWPEA.—Leaf-eating Caterpillar (*Heliothris armiger*), Degilbo; Bean Weevil (*Bruchus obsoletus*), Brisbane; Cowpea Plant Bugs (*Riptortus annulipes*), Bundaberg.

CABBAGE.—Leaf-eating Caterpillars, Ravenswood, Alpha, Kadanga Creek, Toowoomba, and Brisbane; Diamond Moth Caterpillar (*Plutella cruciferalis*), Brisbane; Stem-boring Caterpillar (*Hellula undalis*), Mount Morgan; Potato Cut-Worms (*Agrotis subnigra*), Brisbane.

TOMATO.—Root-gauging Beetle (*Isodon puncticollis*, Macl.), Cleveland; Plant-eating Beetle (*Opatrum nigrum*), Wellington Point; Leaf Mite (*Phytopus sp.*), Brisbane.

CAPE GOOSEBERRY.—Fruit-eating caterpillar (*Heliothris armiger*), Woombye.

SUGAR-CANE.—Mealy Bug (*Dactytopius calceolariæ*), Nambour; Moth Borer (*Nonagriæ exitiosa*), Yandina; Beetle Grub (*Rhopæa sp.*), Childers; Beetle Grub (*Lepidoderma albohirta*), Mackay; Root Parasite or Ground Pearl Insect (*Margarodes sp.*), Bundaberg.

MAIZE.—Stem Borer (*Heliothris armiger*), Darling Downs; Leaf-eating Caterpillar (*Heliothris armiger*), Degilbo; Cut-Worms (*Agrotis upsilon*), Darling Downs, Toowoomba, and Degilbo; Cob-boring Caterpillar (*Conogethes punctiferalis*), Brisbane; Leaf Hopper (*Megalmerus*, Fam. *Fulgoridæ*), Burdekin district and Cairns.

PANICUM GRASS.—Caterpillars (*Agrotis upsilon*), Darling Downs.

GUINEA GRASS.—Scale Insect, Brisbane.

PASTURAGE.—Grasshoppers, Darling Downs.

MISCELLANEOUS GARDEN PLANTS.—(A.) *Trees and Shrubs:* Red Scale Insect (*Aspidiotus aurantii*), on Camphor Laurel, Rockhampton; Circular Black Scale Insect (*Aspidiotus ficus*), the same; Ross' Circular Scale Insect (*Aspidiotus rossi*), Toowoomba; White Wax Scale Insect (*Ceroplastes coccifera*), on Duranta, Sandgate and Childers; Fruit Fly Maggot (*Tephritis Tryoni*), on *Maclura* fruit, Herbert River. (B.) *Herbaceous Plants:* Slugs (*Vaginula sp.*), Brisbane; Orchid Stem Fly Maggot (*Isosoma sp. ? orchidearum*), Brisbane; Root Mite (*Rhizoglyphus echinopus*), on Dahlias and Gladiolus Bulbs, Brisbane; Stem Fly Maggot (? *Bibionidæ*), on Sapiglossis (Fam. *Scrophularineæ*), Brisbane.

TIMBER.—White Ants (*Termes lacteus*), Brisbane; Hardwood Beetle-Borer (*Sinoxylon ? gibbicollis*, Macl.), Brisbane; Soft-Wood Beetle Borer (*Anobium sp.*), Brisbane; Gigantic Ship Worm (*Teredinæ: Mollusca*), Townsville.

FOOD PRODUCTS.—Psocid insect (*Atropos divinatoria*), in Rolled Oats, Brisbane; Cheese Mites (*Tyroglyphus siro*, Lin.), Brisbane; Caterpillars (*Ephestia elutella*, Fam. *Phycitidæ*), in Date Fruit, Brisbane.

MAN-INJURING INSECTS.—Dipterous Insect (*Musca sp.*) reputed to be insect communicative of ophthalmia, Brisbane; Mosquito "Plague" (*Pulex vigilax*), Brisbane; Scrub-Itch Mite (larvæ of *Trombidium*), Moreton district; Centipede (*Heterosoma sulcidens*), Manly; Rat Fleas (*Pulicidæ*) in their relation to man as communicative of plague bacilli; Poisonous Spider (*Latrodectus*), Moreton and Darling Downs districts.

STOCK AND OTHER ANIMAL PARASITES.—Preliminary determinations of different ticks submitted by the Chief Inspector of Stock, and that had been derived from cattle, horses, native bears, &c., representing the genera *Ixodes*, *Rhipicephalus*, *Hæmaphysalis*, and *Hyalomma*.

UTILISATION OF INSECTS.—The Cochineal Insect (*Coccus cacti*), and the question of its being profitably raised on Prickly Pear (*Opuntia vulgaris*); Indigenous *Bombycidæ* as silk producers—for Royal Bacological Station of Padua; Prickly Pear (*Opuntia vulgaris*) repression and destruction by (1) the

Cactus Diaspid Scale Insect (*Diaspis cacti*), and by (2) a Cactus Mealy Bug (*Pseudococcus sp.*), of India and Ceylon. [*Note.*—In connection with the latter it may be stated that steps have been taken to insure its early introduction into the State.] The Parasite of the Scarabæid Beetle Grubs of Sugar-cane (*Dielis formosus*). The Parasite of the Sweet Potato Hawk Moth Caterpillar, named Sturmia (*Diptera: Tachinidæ*) at Zillmere; the European hymenopterous Parasites of the Codling Moth; their names, and the project of their utilisation in the subjugation of this notorious apple-pest in Australia.

IDENTIFICATIONS.—The ascertainment of the names and systematic relations of insects (in some instances comprised in small collections) submitted from time to time by various applicants, with a view to their acquiring such information, has, as in the past, involved the expenditure of much time and labour, and should have stimulated the growing taste for the study of entomology.

INSECTIVOROUS BIRDS.—The collection of insectivorous and frugivorous birds, whose formation has been some time in progress, is almost complete—that is, as far as Southern Queensland is concerned. It comprises no less than 136 glass cases, in which 110 species of birds are represented, and which are devoted to the illustration of the habits as well as of both sexual and seasonal plumage-variations. The specimens, moreover, have been accurately named, and, whenever practicable, observations made and recorded in view of the preparation of a report on them and their economic significance for public information. It is with regret that it has to be placed on record that, notwithstanding the incorporation amongst our Statutes of Native Birds Preservation Acts, the persistent destruction of our native insectivorous birds is a matter of great concern to both agriculturists and horticulturists. This, too, is likely to continue until the natural history relating to our indigenous fauna form part of the educational curriculum of the public schools—even at the cost of the exclusion of other subjects—and some official check be placed upon the possession and indiscriminate use of firearms—at least of special character—a check whose institution and enforcement no sportsman, however ardent he might be, would oppose.

II.—PLANT PATHOLOGY.

Numerous inquiries relating to plant pathology proper, as distinct from the injuries occasioned by the presence and attacks of injurious insects, have also been dealt with by this branch of the Department; although, during the first six months of the period embraced in this report maladies due to purely parasitic life appear to have been held in subjection by the prevalent arid climatic conditions. On the other hand, as already stated, these conditions conduced to the occurrence of constitutional derangements—affecting fruit trees on the one hand, and farm crops on the other—too numerous to be particularised in this review. Of the more important of the former class of plant affections, forming objects of complaint and subjects for inquiry, the following may be mentioned:—

PEACH AND PLUM TREES.—Gumming with bacteriosis, Killarney.

CITRACEOUS PLANTS.—Gummosis, Charters Towers and Toowoomba; acariosis of fruit or russetting thereof, Charters Towers; rottening of fruit, accompanied by presence of *Penicillium* fungus, North Coast district and Brisbane; Leaf Scab of Lemon, caused by *Phyllosticta scabiôsa*, McAlp. Brisbane; Fruit Rot of Tahitian Lime, of undetermined origin, Palmwoods and Oxley.

MANGO.—Leaf Blight, caused by presence of *Glœosporium mangiferæ*, Rai., Brisbane; Fumagine, caused by the presence of coccid insects and *Capnodium* fungus, Brisbane and Mackay.

BANANA.—Constitutional derangement involving the fruit, caused by nematode (*Heterodera* and *Tylenchus*), parasites of roots, Cairns; Fruit Rot, caused by *Glœosporium ? fructigenum* fungus, Cairns and Geraldton.

VINE.—Pustular outgrowths, simulating those produced by the *Phytopus* parasite of the vine; fruit affection, caused by the presence of *Strumella vitis*, McAlp., Esk district; soil frequenting fungus at roots, Charters Towers; Anthracnose, caused by *Glœosporium ampelophagum*, Brisbane, &c.

COFFEE.—Physiological bark affection, Daintree River.

[NOTE.—Coffee leaf Disease (*Hemileia vastatrix*). The recent occurrence—announced in May, 1903—of *Hemileia vastatrix* in British New Guinea, under circumstances that would appear to suggest its reintroduction thereto, although not at present confirmed by the receipt at this office of authentic illustrative material, has, nevertheless, been regarded as a fact sufficiently established to justify the extension of the prohibitive regulations under the Diseases in Plants Act, directed against the importation of plants from all countries in which this notorious malady of the plant named has become established, to the State of the Commonwealth in question. It is a matter for regret that our coffee-growing industry should, at this early period in its development, be menaced by the existence of *Hemileia vastatrix* so near our shores; for it is yet to be learnt that adequate measures have been taken to stamp it out in the quarter alluded to as witnessing this recent manifestation of its presence.]

SUGAR-CANE.—Cane rot accompanying root disease, Herbert River district; Cane smut, caused by *Ustilago sacchari*, Herbert River district; Cane-leaf Freckle, caused by *Leptosphæria sacchari*, *v.* Bred., Herbert River, Geraldton, Cairns, &c.; Cane Rust (*Uredo Kühnii*, W. et W.), Cairns.

PEPPER.—Diseases incident to the pepper plant of commerce not present in the State.

PINEAPPLE.—"Tangle-foot" (root-affection), Ormiston and Brisbane; fruit a symmetry, Maryborough; fruit gummosis, Tiaro; "Black Heart," Nundah.

STRAWBERRY.—Leaf and fruit mildew caused by *Erysiphe humuli*, North Coast district, in three localities. [*Note.*—This serious affection of the strawberry appears to be a new occurrence, dating no further back than some two seasons. Fortunately, it may be almost entirely held in check by the vigorous adoption of the process for coping with it recommended by this office.]

ROSELLA.—Root-affection, Rockhampton.

TOMATO.—Proliferation of floral organs and consequent barrenness, Morven; Leaf Spot, caused by *Septoriá lycopersici*, Brisbane and Wellington Point; leaf destruction, caused by *Phytopus* mite, Brisbane; fruit rot, attended by presence of *Fusisporium solani* and bacteria, Brisbane, &c.

CABBAGE.—Wilting of young plants and leaf destruction, caused by *Peronospora parasitica*, Zillmere.

TIMBER TREES.—Disease of young pine-trees (*Agathis robusta*), Frazer's Island Plantation.

MISCELLANEOUS INVESTIGATIONS OR REPORTS.

1. Certain forms of blindness of human beings and the relation of the fruit of the finger cherry (*Rhodomyrtus macrocarpa*) thereto.

2. The recently ascertained presence of an hydrocyanic acid compound in sorghum, as a possible explanation of the fatality remarked in Queensland amongst stock that had partaken of the plant named.

3. Examination of fodder plants for the detection and identification of parasitic fungi, in view of the occurrence of a certain fatality amongst stock in the Warwick district, under circumstances suggestive of "ergotism" occasioned by their use.

4. Water Hyacinth Destruction.—Suggestion for certain experimental investigations and on the employment of a preparation named "Harvesta Compound" in killing this notorious aquatic-weed in the United States.

5. Measures for adoption in the purchase, disinfection, and storage of seed wheat, calculated to obviate the introduction and establishment, through its agency, of injurious insects and diseases affecting that cereal.

DISEASES IN PLANTS ACT, 1896.

The prevention of the introduction and dissemination of the diseases and of the injurious insects of plants, provided for in the administration of "*The Grape Vines Disease Act*" and proclamations based thereon, and in that of "*The*

Diseases in Plants Act of 1896" and the regulations thereunder, the latter of which measures principally originated with this officer, is of far-reaching importance in the present stage of the history of this State, characterised as it is by so great an extension of both agricultural and horticultural enterprises, and has always been regarded as one of the most urgent duties it is incumbent upon him to co-operate in performing. Hence it has been always sought to utilise in this service not only the exclusive opportunities attaching properly to the posts of entomologist and vegetable pathologist, but those of Inspector under the Diseases in Plants Act and of member of the Board of Advice constituted in accordance with its provisions.

The duties thus discharged have consisted in advising the Minister as to the attitude he should assume with regard to the many technical questions that have arisen in administering the measures alluded to, and regarding the scientific and economic considerations constituting the basis and justification thereof.

In addition, and in the same connection, much attention has been given to the requirements of the inspectors under the Diseases in Plants Act occasioned by difficulties that have been experienced in the course of their duties. Moreover, they have from time to time been accorded the expert advice they have sought to guide them in their decisions, especially whenever it would appear that their contemplated actions might with advantage be reviewed from a special standpoint.

CORRESPONDENCE.

This has been unusually heavy, as is suggested by the foregoing concise summary of the inquiries received. The obligation, however, to confer with professional confrères elsewhere, and to deal with their communications, involves also much literary work supplementary to this.

COLLECTIONS.

The series of insects of different orders, comprising examples of directly and indirectly harmful and serviceable species, that constitutes the collection so indispensable for reference purposes and public enlightenment, to the official economic entomologist, has received numerous small increments during the year, principally through purchases, but to some extent also as the outcome of the liberality of private donors. It is, owing to the constant attention it receives, in a good state of preservation. Its detailed arrangement—a work of great magnitude in consequence of the research that it involves—has, however, to some extent remained in suspense, in consequence of the exacting nature of other duties not admitting of an expenditure of time adequate for the accomplishment of this important work, and to a hesitation to incur expenditure for expensive entomological cabinets that it would necessitate, out of respect for the policy of economy in expenditure obtaining and that it behoves all branches of the Department to respect. These considerations too have operated meanwhile to stay the effectual carrying out of a resolve to seek the necessary authority for preparing a series of exhibition cases in which shall be displayed insects and illustrations of their life-history and habits as object-lessons for direct educational purposes.

LIBRARY.

The accessions to the reference library attached to the office, by purchase, have been confined almost entirely to current numbers of serials and of special works of periodical issue relating to plant pathology and agronomic entomology. The office has, however, very extensive foreign relations, and these have resulted in the receipt of many and important literary donations, made by some of the ablest of the world's scientific men, that have contributed most materially to its perfection and usefulness.

DIRECT EDUCATIONAL WORK.

Queensland Agricultural College.—In the report of the Entomologist for 1898-9 the question of securing the services of that officer in providing the instruction in Entomology for the "second year students" at the Agricultural

College, in accordance with the curriculum relating to the scope of its educational work, was raised. Subsequently, visits were made weekly to this institution; and, on these occasions, addresses were given on Systematic and Economic Entomology to the junior and on Economic and Vegetable Pathology to senior members thereof, the lectures to the separate classes of students being given on alternate occasions. But in January of the present year (1903) application was made to be freed from the obligation of performing these services. This was made on the grounds that, as had been repeatedly brought under your notice by the public, this officer was considerably in arrears with his work—a result that arose in great measure from these visits to the College, and the interruptions in the prosecution of special research that they had necessitated—and that such complaints as were alluded to would, with great probability, be again and again made unless his duties were abridged in the manner suggested. Under the circumstances, and as the outcome of this representation, it was then proposed that monthly visits should alone be made, and instruction on these occasions extended to the senior students only. This proposition was acquiesced in; but its effectual compliance with was frustrated by duties necessitating service in another part of the State. It is hoped that this important work, that, as has been seen, originated in a suggestion emanating from this office, will be resumed by it under circumstances more conducive to its effectual carrying out than those that have hitherto obtained.

HENRY TRYON, Entomologist and Vegetable Pathologist.

REPORT OF THE DIRECTOR, BOTANIC GARDENS AND GOVERNMENT DOMAIN.

At the commencement of the year financial considerations reduced the strength of the staff of the Botanic Gardens. It became necessary, in consequence of the unavoidable retrenchment, to make such disposition of the reduced staff, and to so husband resources as to preserve as far as possible, under the circumstances, the valuable contents of the Gardens, and so avoid what would be not only a serious loss to the State, but a waste of all the care and expense of many years.

The difficulties and anxieties of the position were greatly intensified by the fact that the disastrous drought continued during almost the whole period with merciless rigour. It was only two months ago—in May—that rains fell which brought any permanent relief to suffering vegetation.

The business of fighting a drought like this was rendered much more arduous by the absence of a proper water supply, and still more so by the fact that every gallon of water used had to be paid for. In the battle which had to be fought against the drought in its latest and worst stage, the active and willing assistance of the staff could always be relied on. It is amazing to find that only about half a dozen trees and shrubs out of the thousands of exotic specimens in the Gardens succumbed to the effects of a drought which killed considerable areas of native timber in the near vicinity.

A very strong appeal was made to the Board of Waterworks, through the Minister, for a water supply at a greatly reduced rate, their charge being 1s. per 1,000 gallons, whereas a maximum supply of 6,000,000 gallons for a minimum charge of £75 was asked for. The Board, though they could not see their way to reduce the charge to the extent requested, brought it down one-fourth, or to a rate of 9d. per 1,000 gallons for future supplies, thus making it possible to use 2,250,000 gallons at a cost of £75, which is the sum available for this service.

The bush-houses and glass-houses here cover an area of 28,745 square feet or ·66 of an acre.

For public purposes, such as State schools, municipalities, Government institutions, and the like, 2,498 large-sized plants and 539 cuttings were distributed during the year. By way of exchange were received 1,546 plants, 455 species of seeds, and 856 cuttings, 125 birds, and 11 animals; and given 1,437 plants, 193 species of seeds, and 312 cuttings. Institutions in the city and suburbs to the number of 39 requested the loan of pot-plants for decorative purposes in connection with bazaars and similar movements, and plants to the number of 904 were so lent.

The necessity for constructing a deep drain to the river from the lagoon near Albert street became obvious during the year. It was proposed to carry out this work by the aid of the unemployed, and a small extra grant of £35 was asked for the purpose of purchasing the necessary pipes. This was approved, and the work is now approaching completion. The pipes were, however, purchased by curtailing already authorised expenditure in other directions. The drain is 18 feet deep at the river end, and about 13 chains long, and will completely drain out the lagoon by means of a sluice-valve, or keep the water therein at any desired level at pleasure. The idea is to gradually make the formal outline of this piece of water more picturesque, and at the same time curtail its area, thereby lessening future expense for purchase of water.

During the year I have consistently endeavoured to obtain the greatest effects from the minimum of the expenditure, and the bold and brilliantly-coloured foliage plants which succeed so admirably in our climate have enabled a considerable height of success in this direction to be reached. The Lord Mayor of Sydney, in inscribing his name in the visitors' book which is now kept here, referred to the Gardens as "the most beautiful gardens which I have seen in Australia." Of the variety and beauty of their contents the owners—the public—have just reason to feel proud after such untoward years of flood, drought, and retrenchment.

The foresight and industry of my predecessors should never be forgotten in this connection, particularly of Mr. Walter Hill, for many years director, for to him is due the introduction of most of the noble exotic trees which adorn not only the Gardens but many other positions throughout the State, as well as many of the products which to-day play so large a part in its industrial life.

It is not my business to deal here with the question of the expenditure upon the Gardens, particularly at a time when retrenchment has been so urgent in all directions, but to cheerfully do the best with whatever funds may be granted, though it is permissible to ask that means may be considered in estimating results. It will, however, prove interesting to show the percentages of the various items of expenditure for the Gardens and Domain combined. These are—

Wages	78·38	per cent.
Hardware, tools, timber, coke, machines, pots, seeds, repairs, and sundries	9·10	"
Fodder for horses and food for birds and animals ...	5·04	"
Water	3·48	"
Two horses purchased	2·06	"
Materials for new drain	1·94	"
	100·00	

It will be seen that almost the entire vote is absorbed in wages. The economies which have been found necessary for some time past have prevented the application of manures and fertilisers to the Gardens. This must, of course, affect them adversely, and it is to be hoped that it may be found possible to supply the deficiency in the near future.

In 1894 the system of giving a day's work to the unemployed in exchange for a week's rations was initiated here, thereby avoiding the pauperising influence which the acceptance of a dole is believed to have on the recipients. The plan was found to be successful from most points of view, and from that time, whenever there were, unfortunately, unemployed to be provided for, they were sent here. They were not employed to make and maintain flower-beds. These would have to be abandoned when the unemployed found work, or expensively kept up. They have been employed in doing work which saved expense, and yet did not enter into competition with outside labour; such, for instance, as the drain before referred to, the grading of land, &c.

These men are of varied occupations, and of all stages of efficiency and non-efficiency. Most of them are quite unaccustomed to the work which they find themselves called upon to perform here, but all seem willing to make themselves useful, and cases of loafing are extremely rare. Their work is supervised by members of the regular staff, under my supervision. They are treated with all consideration possible under the circumstances, and cases of trouble have been practically unknown.

In addition to the ordinary duties of maintaining the Gardens, there are others incidental to their public character which consume a great deal of time, and for which, I fear, proper allowance is not generally made. These are the care of the birds and animals, the opening and closing of the Gardens at daylight and dark, the picking up of papers, &c., carelessly and plentifully scattered by the public, the packing of plants required for public purposes, and their despatch to the railway stations, the collection of flowers for the hospital, the protection of valuable plants from injury by the public, particularly at such times as there are thousands of children in the Gardens on holidays, and many other matters, individually small, but aggregating to a very formidable mass of work, all of which has to be provided for.

The collection of plants has been added to as far as possible during the year. Six hundred species of plants not previously in our collections have been sown. The portion of the Gardens which lay for so many years uncultivated, comprising 4 acres, and known as No. 17, was further improved. This land has shown excellent qualities for the growth of roses; one, a huge bed containing 300 plants in 200 distinct varieties, has been fenced and planted. Other three large beds, besides additional beds containing roses of distinct character, displayed a profuse wealth of blooms since the rains begun.

The large plot of coffee shrubs planted on this slope has recovered from the effects of the drought, and is looking splendid. The coffee shrubs which have stood so long in No. 5 have suffered so much from the effects of age and drought that they may now be removed, the younger and more vigorous plot taking their place.

Small plantations of various plants of industrial value have been made in various parts of the grounds during the year, and much attention has been paid to the introduction of trees likely to prove of value for timber.

It is possible to distribute at present to anyone desiring to give them a commercial trial a quantity of cuttings of good basket willows, which succeed as well in the Gardens as anywhere, and for which there should be a payable demand.

There are also for distribution *Paspalum dilatatum*, which has been growing freely over the lawns for some years past; also guinea grass, and para grass, which can be recommended as a most excellent fodder.

Any selector who has good, rich soil can obtain some seeds of the Indian Sugar Palm, which bore most profusely here during the past autumn. It is a plant of considerable economic importance, requires little attention, and appears to succeed here magnificently.

There is a constant stream of inquiries here about horticultural matters, and to these I give all the personal attention possible. During the year 430 official letters, some of considerable length, were written, and 397 received. A very large number of memoranda and minutes relating to exchanges, plants, work, materials, &c., had also to be written. Accounts are kept of all expenditure, posted to its proper subdivisions, to enable well-balanced and economical work to be carried on; the daily work of each man; the species and destination of all plants distributed for public purposes or given or received in exchange; all seeds sown and their ultimate behaviour and destination. All plants planted out are marked with cheap imperishable labels, numbered to preserve their identity, and their legible labelling if ever time and funds admit.

Rainfall, temperature, state of cloud, wind, and weather are taken and recorded here daily, and transmitted to the Weather Office.

The old animal house and potting-shed were demolished during the year, and the grounds in the vicinity laid out and planted. The ground around the new kiosk was also laid out, and lawns formed in that vicinity. A good road, over a quarter of a mile long, was formed of material carted by the Tramway Company from their new line in Edward street. This was a great and much-needed improvement, which would have cost a considerable sum if done in the ordinary way. Acknowledgments are due to His Worship the Mayor for kindly permitting the use of the municipal steam-roller to form this road.

During the spring, I delivered a course of six lectures on forestry to the students at the Agricultural College. Though this is a business which requires to be taught practically, there is reason to hope, from their intelligent attention, that they formed an acquaintance with at least the outlines of a practical science which is now commanding an increasing share of attention in many countries.

The supervision and arrangement of all the matters referred to above, with a view to the best results from the means available, have entailed a busy and anxious but very interesting and on the whole successful year's work, of which I have endeavoured to give a brief and popular sketch.

PHILIP MAC MAHON, Director.

REPORT OF THE TRUSTEES OF THE QUEENSLAND MUSEUM.

Sir,—In presenting our Report for the past year we cannot pretend to feel the pleasure which we were annually able to express when the Museum was making fair progress. The exigencies of the State have of necessity stayed all progress. In our regret for that result we have no doubt that we shall have your sympathy.

Visitors.—If we may fairly estimate the interest taken in the institution, and the educational benefits obtained from it, from the number of persons recorded as visitors, we are entitled to say that they show no sign of waning. There were admitted altogether 68,774—namely, on Wednesdays 35,997, and on Sundays 32,777. The total shows an increase of 2,376 on the number for the previous year, and we are well content that our forecast of a decrease should be dishonoured by the event. In the last year of our establishment in William street the number was 56,638.

Donations.—These have numbered 456, or 77 fewer than last year. The difference is due to two causes—First, our inability to send out collectors into the country who, while pursuing their quests, stimulated our friends in many parts of the State to contribute largely; second, to our loss of the means of printing our annals as in former years. We are no longer able to furnish a *quid pro quo* to the various societies and institutions which look for such return.

Exchanges.—Since June last, when our staff was reduced to its present level, we have, much to the disadvantage of our collections, been compelled to decline many offers of exchange, as these consume time which cannot be spared. The more important of the few which were arranged during the year were a series of skins of mammals and birds sent to Professor Crookshank in return for a collection of Egyptian antiques; birds and minerals, in return for those of West Australia; and sundry exchanges of shells and insects.

Purchase of Specimens.—No fund for this purpose being provided, some serviceable opportunities of enriching the Museum by its means were regrettably lost.

Library.—Accessions to the library by purchase were almost entirely confined to that kind of serial literature which has been found most useful to the staff, and has at the same time been obtained at an expenditure of £40. There has been a notable falling off in the supply of publications by gift in consequence of our inability to make a suitable return. A large number of our books are sadly in need of the art of the binder.

Staff.—In the middle of the year, four of the eight members of the staff were retired, and there fell upon the remaining four so much of the work, to the neglect of their special duties, as they were able to carry on. In 1893 in a building one-third of the capacity of the present one, retrenchment still left three persons to care for its contents.

Weights and Measures.—The standards are maintained in an efficient condition; no appeal to them has been made during the year.

Copyright Act.—Twenty-four certificates were issued.

Signed on behalf of the Board. A. NORTON, Chairman.

REPORT OF THE CHEMISTRY DIVISION.

(Section of Feedstuffs and Products.)

The report of this year is an extension of matters treated in the report of last year, and a statement of analytical results of investigations in the laboratory, which, in their order, are being brought to maturity according to the lines of work laid down in last year's statement.

It was stated in last year's report that "the laboratory of the Department is now engaged in the examination of many of the known varieties of maize. The purpose is to determine the relative feed value of each of the several varieties. . . . . The maize cobs of several varieties are also being examined. This is being done in order that the cob may take its place in the list of animal feedstuffs. The advisability of this work has been most acutely emphasised by the protracted drought, which has caused every description of vegetable growth to be brought into use for the keeping of starving cattle alive."

Eighteen varieties of maize have been examined and the feed value of each determined, the results of which are set forth in the following table. In addition to the varieties which may be distinguished as American varieties, the analysis of a sample from a shipment of Argentine maize is given. This includes the analysis of the Argentine maize as directly imported, and also the analysis of the first crop grown in Queensland from the imported seed:—

ANALYSIS OF MAIZE VARIETIES.

Varieties.	Moisture.	Proteids.	Fats.	Carbo-hydrates.	Ash.
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
Sydney Red-nibbed	11·90	12·96	5·50	60·50	1·67
Ninety Days	11·87	13·28	5·76	69·32	1·59
Balderman	12·41	12·84	5·47	62·22	1·41
Sixty Days	11·59	13·36	5·96	62·66	1·28
Riley's Favourite	12·23	13·80	5·33	63·80	1·40
Golden Beauty	11·14	13·04	5·99	69·91	1·62
Early White	12·44	12·55	5·52	72·41	1·60
Hawkesbury Champion	12·13	12·95	5·41	66·80	1·54
Mastodon	11·81	13·29	5·44	63·49	1·53
Golden Superb	12·01	12·09	5·35	68·06	1·61
Longfellow Dent	12·21	13·61	5·00	65·21	1·64
Early Hogan	12·38	13·30	6·01	67·10	1·67
Legal Tender	11·31	13·67	5·64	66·06	1·52
Piaza Queen	12·21	13·21	5·27	67·43	1·61
Star Leeming	11·56	12·91	5·36	64·21	1·65
Macleay River	11·80	12·46	5·42	63·60	1·53
Means	12·00	13·10	5·50	65·80	1·55
Argentine (Imported)	12·00	10·69	6·04	63·20	1·66
Argentine (Queensland)	11·28	12·92	5·20	61·00	1·45
United States	10·93	9·88	4·17	71·95	1·46

The example given of United States' maize is taken from the publications of the Department of Agriculture, Washington. The figures represent the average of the varieties of maize exhibited at the World's Fair, Chicago, the analysis being made in the laboratories of the United States' Chief Chemist, Dr. H. W. Wiley.

It is specially noteworthy that the Queensland varieties of maize which were grown at the State Farm, Westbrook, are very much richer in proteids, also in fats, than the similar varieties grown in the United States. This is a matter of special import, since the proteids, being the flesh-forming nutrients to a notable extent, determine the forage value of feedstuffs. In a shipment of a 100,000 tons it is seen that the Queensland maize furnishes 13·10 thousand tons of proteids against 9·88 thousand tons contained in the American varieties. This is a matter of leading import in large affairs, such as army contracts, and no less so in smaller transactions. It is indicated, on the other hand, that varieties of maize growing in the soil and climatic conditions of Queensland incline to starch formation in a less degree than in the United States. This indication appears to receive some support from the behaviour of the Argentine maize grown in this State; it is seen that the Queensland grown Argentine variety contains 2 per cent. less starch than was found when it was imported. The behaviour of the Argentine maize grown in Queensland also confirms the tendency to a higher proteid formation in Queensland conditions. The directly imported Argentine contained 10·66 per cent. of proteids, while the Queensland-grown sample of the same maize yielded 13 per cent. Futher data are required, however, before these indications can be pronounced certain.

At this place it is necessary to correct the impression circulated by the trade that Argentine maize has a higher feeding value than Queensland-grown maize. So far as the laboratory observations have gone it is unmistakably indicated, first, that Argentine maize possesses a notably lower feed value than the Queensland varieties; second, that the Argentine appreciates quickly and notably in value when grown in the natural conditions of Queensland. To determine the agricultural and commercial values of the different varieties of maize, in addition to the chemical composition, it is necessary to know their yielding power per acre. When further and more reliable data are to hand, giving the yields of the varieties, and in different types of soil, the economic equivalent of each variety will be determined and made known. From the double standpoint of the yield per acre and the contents of food nutrients, so far as the experiments indicate at present, the varieties Balderman and Sixty Days are pre-eminently the best. The result may be modified, however, when these varieties are grown in other types of soil.

ANALYSES OF MAIZE COBS.

Varieties.	Moisture.	Proteids.	Fats.	Carbo-hydrates.	Ash.
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
Sydney Red-nibbed	9·14	2·26	0·46	26·52	1·46
Ninety Days	9·62	2·22	0·59	27·44	1·74
Balderman	8·43	2·57	0·70	27·74	3·14
Sixty Days	8·92	2·84	0·52	26·26	1·71
Riley's Favourite	8·59	1·87	0·66	30·22	1·47
Golden Beauty	7·22	2·36	0·93	28·78	1·91
Early White	7·98	2·52	0·81	32·40	1·62
Hawkesbury Champion	8·13	2·67	0·86	31·89	1·61
Mastodon	7·94	2·90	0·85	31·50	1·64
Means	8·44	2·47	0·71	29·19	1·70

The analyses indicate that the corn cobs are a valuable adjunct to the maize as a feedstuff, and particularly in conditions of drought and feed scarcity such as the State has recently experienced. It was explained in the report of last year that the omnibus companies of Europe are using the cob ground down with the maize as a mixed feed, which is supplemented with bran, and with satisfactory results.

In the report of last year it is further stated that "other great classes of plants that are bound up with the necessities of the farm," such as the grasses, cane, and other members of the Gramineæ, in addition to the great family of the Leguminosæ, would be brought under investigation, and their feed values made known. The results of these investigations up to date are set forth briefly in the following table :—

COMPOSITION OF SOME GREEN FODDER PLANTS.

Varieties.	Water.	Dry Substance.	Composition of the Dry Substances.			
			Proteids.	Fats.	Carbo-hydrates.	Ash.
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
Sorghum (general)	65·80	34·20	5·38	2·29	21·25	6·97
Sorghum (Planter's Friend) ...	74·10	26·90	8·15	7·72	44·06	5·20
Sorghum (Early Amber) ...	78·90	21·10	9·62	6·07	39·04	4·93
Sugar-cane (cane tops) ..	66·80	33·20	6·11	3·17	16·39	7·51
Mackay (stalk)	71·40	28·60	9·39	1·20	38·26	2·86
Sugar-cane (leaves)	71·20	28·80	9·00	2·60	15·97	6·56
Isis (cane tops)	77·20	22·80	7·39	...	15·95	5·35
Isis (stalks)	71·42	28·58	4·73	...	43·51	2·99
Paspalum (very fresh) ...	70·60	29·40	12·56	2·38	18·85	12·88
Paspalum (drought-dried) ...	40·40	59·60	8·16	0·46	24·19	7·56
Panicum muticum	76·40	27·60	13·45	2·07	14·40	12·24
Guinea Grass (fresh)	73·95	26·05	15·80	2·03	10·45	13·97
Guinea Grass (very fresh) ...	87·23	12·77	5·22	1·79	19·73	12·20
Broom Corn	67·20	32·80	8·04	4·42	14·90	7·77
Soudan Millet	66·96	33·04	11·59	5·75	26·21	9·50
Kafir Corn	70·82	29·18	9·72	7·47	25·08	7·92
Lab Lab	79·60	20·40	15·77	3·63	14·86	11·67
Saltbush (O.M.)	64·90	35·10	17·81	2·85	22·71	16·57
Saltbush (A.L.)	79·20	20·80	19·56	3·65	10·14	16·68

It is seen that the analyses given in the table are mainly of plants belonging to the Gramineæ or grass family.

At the Mackay Experiment Station several varieties of plants belonging to the Leguminosæ and other orders have been grown with a view to determine their value as green manure crops; certain of these have a high value as feedstuffs, and for this reason the analyses are given, and for purpose of comparison with the maize and other Gramineæ.

COMPOSITION OF THE DRY SUBSTANCE OF SOME LEGUMES AND OTHER PLANTS.

Varieties.	Proteids.	Fats.	Carbo-hydrates.	Ash.
	Per cent.	Per cent.	Per cent.	Per cent.
Soja Beans	19·02	7·14	28·68	6·88
Yellow Lupin	22·52	8·42	15·01	7·51
White Lupin	30·52	6·83	10·87	6·86
Cowpea	27·28	5·38	14·94	8·95
Winter Vetch	22·48	7·10	11·70	10·38
Velvet Bean	21·53	5·44	14·00	9·57
Black Mauritius Bean	20·48	4·28	8·50	5·91
White Mustard	26·25	3·30	14·05	16·32
Rape	25·10	4·81	15·06	14·85

Certain of the plants in this table are unfit for fodder purposes in the green state, including the lupines in particular. Special note is made of the mustard and rape plants on account of the great crops which they can produce and of their high value for feed purposes.

It is observed that the statement of composition of the several plants is made to cover only the more essential nutritive constituents. A detailed statement would be out of place in this report.

At a later time, when the laboratory has covered upon a broader scale the investigations now in course, it will be recommended that a "Bulletin of Feedstuffs and Products" be published which shall embrace generally the forage plants and products of the State, and indicate the composition and nutritive values of all crops and produce furnished by its various soil and climatic conditions.

It was also stated in the report of last year that "the laboratory was about to look into the food values of some of the better known varieties of wheats." Since that time it has become necessary, as a result of the drought, to restock the State to a large extent with imported varieties of seed wheat. As a matter of fact, a new beginning practically is being made in wheat production, and, as stated, with largely imported varieties.

The laboratory therefore decided to make a full examination of the nutritive values of all the varieties that have been distributed as seed within the State. It is also intended to collect samples from the bulks of all the varieties that shall have been grown upon the types of soils within the State, and to analyse those in order to note what increase, or otherwise, of nutritive and bread-making value has resulted from the growing of those wheats in Queensland conditions. The Agricultural Adviser, Mr. Peter McLean, furnished the director with 22 varieties of wheats, which he has distributed within the State, and the laboratory is at this time engaged with their examination.

Examinations of tapioca starches have been made, the samples being furnished by the manager of the Kamerunga State Nursery. These starches show a good quality, and a relative freedom from the impurities which render the manufacture of tapioca difficult.

As a part of the new work that the Department has in purpose, investigations will be made of the pineapples of the State, as recently explained by the Minister for Agriculture. It is intended to examine and determine the compositions of the normal pines, and to compare with these the constitution and condition of pineapples known to be diseased. It is hoped that by the aid of chemico-bacteriological examinations further light will be cast upon the trouble now assailing the pineapple industry.

In conjunction with the examination of the pineapples, analyses are about to be made of soils in which the fruits are being grown. The predisposing cause of the disease may be found in the soil, due to lack of given essential food constituents. The question is thus to be approached from the standpoint of the fruit and of the soil in which it has grown. One of the soil chemists of the Bundaberg laboratories has already samples of the chief pineapple localities, and the analyses will be proceeded with in their order. The examination also of the pine fruits will be undertaken by the Brisbane laboratory at as early a date as current investigations will allow.

It was explained in the report of last year that all inorganic work, including the examination of soils, waters, &c., is conducted in the laboratories at Bundaberg, and the examination of organic substances, including feedstuffs, products, fruits, &c., is carried out in the Brisbane laboratory, for which kinds of work each laboratory is more specially equipped. This division has been abundantly justified by the facility and expedition with which the work has progressed in the laboratories.

MR. BRÜNNICH'S REPORT.

The following is the report of the chemist made to the Director upon the analytical work of the laboratory of the past year:—

STATEMENT OF LABORATORY WORK.

Substances.	Samples.	Analyses.
Seed of Green Manure Plants	7	10
Seed of Maize Varieties	18	31
Maize Cobs	9	9
Samples of Green Crops	27	40
Mineral Matters of Green Crops (full analyses)	51	51
Feedstuffs (grasses), Sugar-cane, &c.	35	52
Hydrocyanic Acid Examinations of Sorghum, Maize, and Grasses	56	86
Cyanides and Dipping Fluids	6	6
Starch Samples	4	4
Totals	213	289

J. C. BRÜNNICH, Chemist.

It is explained that each of the analyses included several determinations, according to the partial or complete nature of the examination.

Concerning the investigations of sorghum and other crops in relation to the matter of cattle poisoning, statements have already been made to the Minister for Agriculture, and due warnings have been issued to farmers and others covering this important question.

WALTER MAXWELL, Director.

SORGHUM POISONING.

[BY DR. MAXWELL.]

It will be borne in mind that the subject of the effect of feeding green sorghum to animals, especially to cows, which are liable to have a very ravenous appetite for such succulent food, came up for discussion before the annual Agricultural Conference held in Bundaberg two years ago. At the instance of the Minister for Agriculture, the Hon. D. H. Dalrymple, I remarked, as bearing upon the question, that it was hardly a matter for general discussion, but rather one for special investigation by the laboratory. Those observations appear to have been amply confirmed by the results of examinations that have been undertaken since that time.

A preliminary notice has already been made by me to the Minister stating that, as a result of the examination of sorghum grown under our own direction in the Botanical Gardens, it has not only been proven that a poison called hydrocyanic (prussic) acid is present in sorghum during stages of its growth, but that the proportion of poison thus found is very largely governed by the nature of the soil, particularly its richness in nitrogenous elements of plant food.

I will explain that small plants of sorghum were planted in the Botanical Gardens, and in a soil almost exclusively sand in its composition. One series of plantings was allowed to grow without any special manurial assistance, and another series was manured with nitrate of soda, a manure whose chief element is nitrogen. This experiment was made in order to see if the supply of additional nitrogen to the soil affected the amount of prussic acid incorporated in the growing plant—nitrogen being an element of that poison. The results, according to repeated analyses made by Mr. J. C. Brünnich, who has carried out the laboratory work, have shown, with something approaching mathematical accuracy, that the supply of available nitrogen increases the amount of poison that the sorghum and other plants are capable of making and storing up within their composition. These facts fully prove the statement intimated by me at the Bundaberg Conference, that sorghum and similar plants, when grown on rich soils, would be more liable to contain highly dangerous amounts of the poison than when grown on soils poor in nitrogen—in other words, that the nature of different soils very largely governs the amount of danger.

Relating to the age or stages of development of the sorghum plant when it is most dangerous to allow animals to feed freely upon it, the investigations show that it is not safe to let stock have all that they will eat until the stage of growth when the sorghum is preparing to seed. The plant, when very young, and from the age of three up to seven weeks, contains distinctly dangerous amounts of prussic acid. After that age the poison rapidly disappears by decomposition, the nitrogen passing over into other and strictly nutritious elements of food. When the flowering stage is reached, not more than a trace of the poison is found. As the growth does not strictly depend upon the age or the number of weeks since it was planted, it is better to speak of stages of development, and for this reason it may be generally stated that the sorghum plant, until it approaches the flowering or seeding stage, is not safe for free feeding.

It must be understood, however, that even young sorghum and such plants as may be known to contain dangerous amounts of poison may be judiciously used as a green mixture with dry hay chaff to make the feed tasty to animals. When diluted in this way, the green sorghum being very carefully stirred up and mixed with large quantities of the dry food, no harm will follow, and the dry food is made capable of use. Yet it is necessary to very expressly repeat the certain danger of allowing stock to have free course to the young growing sorghum, since it is now proven that the whole trouble is due to the presence of the poison stated. The fact of the poison being prussic acid also accounts for the sudden fatalities following immediately upon cows having free access to sorghum, the prussic acid spreading rapidly through the system and having an almost immediate fatal effect.

It may here be stated that the plant-poisoning investigations have been extended to include also maize, sugar-cane, and most of the grasses in use. Prussic acid has been found in quantities varying from a mere trace up to the danger point. So far, however, only *Panicum muticum* comes anywhere near the sorghum plant in its dangerous content of the poison, and several, including sugar-cane and *Paspalum*, so far as they have been tested, being completely free from prussic acid.

It is intended to extend, in due time, these examinations, bearing upon their poisonous contents, to all the crop plants grown or growing and made use of in the State. This is highly important work, the importance of which is more accentuated and brought to light during seasons of drought, when all available kinds of plant produce are pushed into service as feedstuffs. Incidentally, I may remark that the Experiment Station at Mackay is now making careful comparative tests of some eight or ten different varieties of sorghum, and not only for the purpose of observing their liability to contain poisonous elements, but also to determine their relative values as feedstuff. The results of these experiments and tests will be fully placed at the service of farming communities as soon as they are to hand.

The data covering these examinations are to be published in full through the official journal, and for this reason I have not weighted this letter with matters of detail.

It is interesting to note that investigations of the sorghum plant have been made by scientific men recently in other countries, and that prussic acid has been found in the plant. The investigators in those countries, however, do not appear to have attempted to decide the stage of growth at which the plant becomes safe to use; they have confined themselves so far to the recognition of the poison in the plant.

Investigations covering the examination of varieties of maize grown in Queensland, and also of green crops of feed and other manure purposes, which have been grown at the Mackay station, will be fully set forth in later publications.

Addendum.

It has been omitted to state that the rather common belief amongst farmers that sorghum ratoons are more liable to be poisonous than plant sorghum is a mistake. The results of our work have shown in all cases that the young plant sorghum has contained more prussic acid than the ratoons of the same age. It is important that the farmers shall be fully aware of this fact in order to prevent them taking liberties with the ratoon sorghum.

REPORT OF MEAT AND DAIRY PRODUCE ENCOURAGEMENT BOARD.

24th September, 1903.

SIR,—I have the honour to submit to you a report on the operations of the Board appointed under the provisions of "*The Meat and Dairy Produce Encouragement Acts*, 1893 *to* 1901," for the year ending the 30th June, 1903.

ADVANCES AND REPAYMENTS.

No fresh advances were made during the year, nor were any applications for advances received. The restriction of this portion of the Board's operations, so far as the Dairy Fund is concerned, no doubt being entirely due to frightfully severe losses sustained by stockowners through the late devastating drought. This contention is fully borne out by the fact that already numerous inquiries from all parts of the State are being received for information as to the terms and conditions upon which advances may be obtained for the erection of district butter factories, mostly on co-operative lines.

The total amount of advances remaining on the books on the 30th June, 1903, was—

MEAT FUND.

	£ s. d.	£ s. d.
Southern district	25,165 14 0	
Central district	25,199 11 5	
Northern district	25,634 1 3	
Carpentaria district	2,900 0 0	
		78,899 6 8

DAIRY FUND.

	£ s. d.	£ s. d.
Southern district	5,296 7 0	
Central district]	1,000 0 0	
Northern district	950 0 0	
Carpentaria district	...	
		7,246 7 0
Total		£86,145 13 8

The amount repaid by borrowers in accordance with the Act during the year was—

MEAT FUND.

	Interest. £ s. d.	Redemption. £ s. d.	Total. £ s. d.
Southern ...	1,927 1 1	1,980 13 8	3,907 14 9
Central	1,012 14 6	1,862 8 2	2,875 2 8
Northern ...	870 2 10	2,119 13 8	2,989 16 6
	£3,809 18 5	5,962 15 6	9,772 13 11

DAIRY FUND.

	Interest. £ s. d.	Redemption. £ s. d.	Total. £ s. d.
Southern ...	26 5 10	18 7 4	44 13 2

The recent disastrous drought considerably affected the repayments in connection with the advances from the Dairy Fund, rendering it necessary for the Board to grant an extension of time to several companies in which to pay the amounts due. But, now that welcome and copious rains have fallen throughout the State, and with every prospect of a return of good seasons, the action of the Board in not pressing these defaulting borrowers will, no doubt, be justified at an early date. In one case, however (a creamery upon which £120 had been advanced), the mortgagors, owing to the fact that all or nearly all the dairy cattle in the district were killed by the drought, notified that they could not carry on, and requested the Board to take possession of their security, and realise upon it. This action was taken, and, after unsuccessfully endeavouring in several ways to obtain some person or company to take over the creamery subject to the mortgage debt, the creamery was placed in the hands of an expert dairy manager for disposal; and it is regretted that only one offer of £52 10s. could be obtained. This was finally accepted, and is the first actual loss sustained in connection with advances from these Funds.

It may not be out of place to mention here that the principal cause of this loss, apart from the large decrease in the herds of the shareholders in the creamery, is that most of the dairy farmers in Southern Queensland have adopted the hand separator, thus greatly depreciating the value of all steam plants such as this one. This action is not conducive to the improvement of the butter produced at the manufactories, as the cream thus separated is delivered by each individual as he is able to send it to the railway, and it arrives at the factory in various degrees of ripeness, thus rendering it very difficult for the manufacturer to make an article which will compete successfully in the markets of the world. It is, therefore, to be regretted that these central creameries or separating stations are for the moment as it were "out of fashion," as there is no doubt that the cream, when regularly delivered from a common centre daily, must reach the factory in a more even degree of ripeness than when received from various centres from individual suppliers delivering at varying periods of time.

It was also found necessary to defer the time for the payment of accrued interest due in respect of an advance upon a Northern meatworks, owing to the inability of the owners of the works to obtain cattle for treatment at remunerative rates. In another similar case in the Central district, no claim was made for the payment of redemption instalments which became due. This company has, however, met its interest payment to date, and there is every prospect that they will be in a position to reopen their works at an early date, when, no doubt, the outstanding amount due for redemption will be paid. In the latter case it may be mentioned that a mortgage, coming after the Board's, is held by a financial institution for a sum in excess of the amount advanced by the Board, thus practically guaranteeing the repayment of the advance from the Fund.

Table A attached shows clearly the exact position of each advance as on the 30th June last.

REFUNDMENTS TO CERTIFICATE HOLDERS UNDER THE AMENDMENT ACT OF 1895.

During the year the sum of £22,200 was made available out of the amounts repaid to the Meat Fund in the Southern, Central, and Northern districts respectively, thus enabling the Board to make refundment payments to the holders of certificates issued under the provisions of the Act of 1895 at the following rates, viz.:—

	£	s.	d.
Southern district, at 3s. in £1	5,665	9	9
Central district, at 3s. in £1	5,140	8	5
Northern district, at 6s. in £1	7,878	13	6
	£18,684	11	8

This appropriation also permitted the Board to pay in full all claims made by holders of certificates drawn against these Funds for the sum of £1 and under. The amount thus refunded to 30th June being—

	£	s.	d.
Southern district	67	11	2
Central district	18	13	9
Northern district	15	10	3
	£101	15	2

making a total refundment for the year of £18,786 6s. 10d. as follows:—

	£	s.	d.
Southern district	5,733	0	11
Central district	5,159	2	2
Northern district	7,894	3	9
	£18,786	6	10

The number of certificates upon which refundments were made was—

	Southern District.	Central District.	Northern District.	Total.
Paid in full ...	118	30	24	172
Paid on account	900	570	416	1,886
	1,018	600	440	2,058

The cost of distributing this amount was £247 7s. 6d., the principal items contained therein being—

	£	s.	d.
Secretary, commission on disbursements ...	87	10	5
Accountant, salary from 4th July to 2nd December ...	82	5	1
W. Walker, messenger, bonus ...	9	5	0
Postages ...	33	12	8

This work involved a very great amount of extra correspondence, and required the utmost care and accuracy on the part of the officers intrusted with the carrying out of the refundments.

The Board were extremely fortunate in being able to obtain the services of Mr. M. Hudson, whose knowledge of the accounts acquired when keeping the assessment and other registers in connection with the collection of the funds in 1893-4-5-6 was found invaluable. As it was, it was only by the closest application during the first four months of the year that the work was performed by the staff available, and it is satisfactory to know that the method adopted for making the payments to claimants has received unanimous commendation from those pastoral companies and banks through whom the bulk of the business was transacted.

Appended will be found a statement of receipts and expenditure from the inception of the Fund in December, 1893, to the 30th June, 1903, from which it will be noted that the interest allowed on the credit balance of the Meat Fund has up to the present more than met the expenses of administration of that Fund.

In addition to his ordinary duties in inspecting and reporting on the various securities held by the Board, the surveyor to the Board, acting at the request of the Chief Inspector of Stock, and with the sanction of the Board, inspected and reported upon the whole of the butchers' abattoirs handling the fresh food supply of Brisbane, Ipswich, Toowoomba, Warwick, Dalby, Roma, Charleville, Gympie, Maryborough, Bundaberg, and Gladstone. This additional work involved the writing of eighty-five reports, dealing especially with the suitability of the sites, the available water supply, the pollution of fresh water in the streams in the neighbourhood of certain of these abattoirs, the antiquated and obsolete planning of some of the yards, and the sanitary conditions existing in every case. Sixty-seven of the premises inspected were licensed under "*The Slaughtering Act of* 1898," and eighteen were registered under "*The Live Stock and Meat Export Act of* 1895," including all meatworks operating outside of "*The Meat and Dairy Produce Encouragement Act of* 1893." Plans and specifications of a modern private abattoir for butchers were also prepared by the surveyor at the request of the Chief Inspector of Stock for his guidance when framing fresh regulations to govern the special business in the interest of the public health.

Operations during the year under the "Vote for Loans in Aid of Co-operative Agricultural Production," which is administered by the Department of Agriculture, acting upon the recommendation of the Board, were confined to the advancing of £1,370 to the Dalby Farmers' Flour-milling Company, Limited, for the erection of a mill of a capacity of three bags of flour per hour, together with a suitable grain store, and of £138 to the Roma Co-operative Milling Company, Limited, for the erection of a flour store.

From the statement appended it will be seen how each advance stood on the 30th June, and, now that there is every prospect of a record yield of wheat and a good dairying season in this State, it is considered that the flour-milling and dairying companies should make every effort to reduce substantially the amount outstanding to the Treasury for interest and redemption.

W. CHAS. GREEN,
Secretary.

TABLE A.

ADVANCES FROM MEAT FUND AS ON 30TH JUNE, 1903.

To Whom Advanced.	Amount Authorised.	Amount Advanced.	Repayments to 30th June, 1903.		Balance.	Payments in Arrears to 30th June, 1903.		Remarks.
			Interest.	Redemption.		Interest.	Redemption.	
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	
Southern District.								
Queensland Meat Export and Agency Company, Ltd., Eagle Farm	13,250 0 0	13,250 0 0	4,099 5 10	2,251 7 8	10,998 12 4			
Borough of South Brisbane and Messrs. Birt and Co., Ltd., South Brisbane	10,000 0 0	10,000 0 0	2,715 17 9	832 18 4	9,167 1 8			
Charleville Refrigerating, Preserving, and Boiling Down Company, Ltd.	5,000 0 0	5,000 0 0	1,041 4 1	...	5,000 0 0	*a* 1,071 15 7	...	*a* Since paid.
Central District.								
Broadsound Meat Company, Ltd.	6,000 0 0	5,852 15 0	1,635 16 3	...	5,852 15 0	*a* 107 6 1	*b* 994 9 4	*a* Since paid. *b* Allowed to remain in abeyance for the present. Works not in operation.
Gladstone Meat Works of Queensland, Ltd.	22,000 0 0	21,500 0 0	5,880 6 2	3,653 3 7	17,846 16 5			
James Wilson	1,500 0 0	1,500 0 0	*a*	*a*	1,500 0 0	*a*	*a*	*a* No payment yet due.
Northern District.								
Queensland Meat Export and Agency Company, Ltd., Townsville	13,250 0 0	13,250 0 0	4,099 5 10	2,251 7 8	10,998 12 4			
Bergl Australia, Ltd., Bowen	16,052 10 0	16,052 10 0	4,248 19 0	6,921 11 4	9,130 18 8	*a* 182 12 4	*a* 495 9 9	*a* Paid, 3rd July, 1903.
Mackay Meat and Dairy Export Company, Ltd.	6,350 0 0	6,000 0 0	...	...	6,000 0 0	*a* 1,048 15 11	...	*a* Allowed to 25th April, 1904, to pay.
Carpentaria District.								
Queensland Meat Export and Agency Company, Ltd., Burketown	2,900 0 0	2,900 0 0	...	...	2,900 0 0	*a*	*a*	*a* No payment yet due.
£	96,302 10 0	95,305 5 0	23,720 14 11	15,910 8 7	79,394 16 5	1,410 9 11	1,489 19 1	

ADVANCES FROM DAIRY FUND AS ON THE 30TH JUNE, 1903.

To Whom Advanced.	Amount Authorised.	Amount Advanced.	Repayments to 30th June, 1903. Interest.	Repayments to 30th June, 1903. Redemption.	Balance.	Payments in Arrears, 30th June, 1903. Interest.	Payments in Arrears, 30th June, 1903. Redemption.	Remarks.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	
Southern District.								
Greenmount Dairy Company, Ltd.* ...	200 0 0	200 0 0	71 11 0	51 13 2	148 6 0	*a* 2 19 4	*a* 9 7 3	*a* Paid 3rd July, 1903.
Ditto	500 0 0	500 0 0	...	...	500 0 0	...	...	No payment yet due.
Pilton Dairying Company, Ltd.†	462 0 3	462 0 3	149 4 3	78 9 10	383 10 5	*a* 22 3 7	63 5 2	*a* Allowed time owing to unfavourable seasons. Expect to resume repayments at an early date.
Daly Bros., Jondaryan*	350 0 0	350 0 0	99 4 11	29 3 0	320 17 0	*a* 18 12 11	*a* 46 1 7	*a* Payment of balance of loan and interest demanded. Proprietors promise repayment in near future.
Wallumbilla Co-operative Creamery ‡ ...	71 0 0	71 0 0	...	...	71 0 0	*a* 18 13 8	*a* 5 18 2	*a* Allowed time owing to unfavourable seasons.
Teviotville Farmers' Co-operative Dairy Company, Ltd.‡	120 0 0	120 0 0	20 0 0	...	*a* 120 0 0	*a* 7 0 6	...	*a* Security taken possession of and sold, realising— £ s. d. Interest ... ... 7 0 6 Redemption ... 42 17 0 49 17 6 Payment made on 20th August, 1903.
Cressbrook Dairy Company §	775 0 0	775 0 0	...	...	775 0 0	...	...	No payment yet due
Milora Farmers' Co-operative Dairy Company ‡	100 0 0	100 0 0	...	...	100 0 0	...	...	" "
Lord John Swamp Co-operative Dairy Company ‡	75 0 0	75 0 0	...	...	75 0 0	...	...	" "
Mount Walker Co-operative Creamery Company, Ltd.‡	87 0 0	87 0 0	...	...	87 0 0	...	...	" "
Silverwood Dairy Factory Company, Ltd., Gympie †	1,200 0 0	1,200 0 0	...	...	1,200 0 0	...	...	" "
Charles Sealy, Trelawny §	1,400 0 0	1,400 0 0	...	...	1,400 0 0	...	...	" "
Ramsay Dairy Company, Ltd.‡	125 0 0	125 0 0	...	...	125 0 0	...	...	" "
Central District.								
Peak Downs Butter Factory Company, Ltd.†	1,000 0 0	1,000 0 0	...	...	1,000 0 0	...	...	" "
Northern District.								
Mackay Meat and Dairy Export Company, Ltd.†	1,015 0 0	950 0 0	...	...	950 0 0	...	...	" "
£	7,480 0 3	7,415 0 3	340 0 2	159 6 0	7,255 14 3	69 10 0	124 12 2	

* Cheese factory. † Butter factory. ‡ Creamery. § Condensed milk factory.

TOTAL RECEIPTS AND EXPENDITURE FROM INCEPTION OF FUND TO 30TH JUNE, 1903.

MEAT FUND.

—	Southern.			Central.			Northern.			Carpentaria.			Total.		
	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.
RECEIPTS.															
Assessments	42,834	8	8	44,085	16	2	30,430	10	6	6,477	3	10	123,827	19	2
Less Refunds	920	13	2	1,583	11	6	631	3	3	639	13	4	3,775	1	3
	a 41,913	15	6	42,502	4	8	29,799	7	3	5,837	10	6	120,052	17	11
Interest on Fund	1,946	5	2	1,860	3	0	524	8	3	408	17	6	4,739	13	11
Inspection Fees, &c.	145	14	0	96	9	3	210	2	6	10	16	0	463	1	9
Loans—Repaid	5,416	6	0	3,653	3	7	11,972	19	0	...			21,042	8	7
Loans—Interest on	8,067	4	5	7,496	2	5	8,712	13	6	...			24,276	0	4
Total	57,489	5	1	55,608	2	11	51,219	10	6	6,257	4	0	170,574	2	6
EXPENDITURE.															
Salaries and Contingencies	1,220	13	2	1,412	13	1	1,045	19	8	523	0	8	4,202	6	7
Loans	30,582	0	0	28,852	15	0	38,102	10	0	2,900	0	0	100,437	5	0
Refunds to Certificate Holders	5,733	0	11	5,159	2	2	7,894	3	9	...			18,786	6	10
Total	37,535	14	1	35,424	10	3	47,042	13	5	3,423	0	8	123,425	18	5
Balances, 30th June, 1903 ... ... £	19,953	11	0	20,183	12	8	4,176	17	1	2,834	3	4	47,148	4	1

a he Refundment Certificates which have been issued against these amounts to 30th June, 1903, were—

Southern.	Central.	Northern.	Carpentaria.	Total.
£40,243 3 10	£36,337 4 6	£28,963 9 2	£4,979 17 1	£110,523 14 7

Total Receipts and Expenditure from Inception of Fund to 30th June, 1903.

DAIRY FUND.

—	Southern. Erection.	Southern. Bonus.	Central.	Northern.	Carpentaria.	Total.
Receipts.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Assessments	4,714 7 4	3,127 10 10	4,319 17 8	4,461 0 10	707 2 1	17,329 18 9
Less Refunds	9 2 1	0 1 0	3 4 6	0 4 6	16 12 8	29 4 9
	a 4,705 5 3	3,127 9 10	4,316 13 2	4,460 16 4	690 9 5	17,300 14 0
Interest on Fund	126 4 9	101 7 4	306 10 5	319 10 5	52 11 6	906 4 5
Inspection Fees, &c.	87 6 0	50 3 0	10 10 0	5 5 0	...	153 4 0
Loans—Repaid	5,457 14 5	...	...	...	...	5,457 14 5
Loans—Interest on	1,219 13 2	...	...	...	...	1,219 13 2
Loan—From Revenue	600 0 0	...	...	...	...	600 0 0
Total	12,196 3 7	3,279 0 2	4,633 13 7	4,785 11 9	743 0 11	25,637 10 0
Expenditure.						
Salaries and Contingencies	1,310 8 5	288 13 2	749 0 9	652 4 7	191 17 2	3,192 4 1
Loans	10,763 8 8	...	1,000 0 0	950 0 0	...	12,713 8 8
Bonuses	...	2,990 7 0	...	...	...	2,990 7 0
	12,073 17 1	3,279 0 2	1,749 0 9	1,602 4 7	191 17 2	18,895 19 9
Balances, 30th June, 1903	£122 6 6	...	2,884 12 10	3,183 7 2	551 3 9	6,741 10 3

a The Refundment Certificates which have been issued against these amounts to 30th June, 1903, were—

Southern	Central.	Northern.	Carpentaria.	Total.
£5,566 0 7	£3,247 18 10	£3,171 6 6	£531 16 4	£12,517 2 3

ADVANCES FROM THE VOTE FOR LOANS IN AID OF CO-OPERATIVE AGRICULTURAL PRODUCTION AS ON 30TH JUNE, 1903.

To Whom Advanced.	Amount Authorised.	Amount Advanced.	Repayments to 30th June, 1903.		Balance.	Payments in Arrears, 30th June, 1903.		Remarks.
			Interest.	Redemption.		Interest.	Redemption.	
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	
Bundaberg Co-operative Dairy Company, Ltd.*	800 0 0	800 0 0	97 4 1	136 10 4	663 9 8	*a* 38 16 6	*a* 74 15 6	*a* Company allowed time in which to pay owing to adverse seasons; promise to reduce amount this year.
Ditto †	350 0 0	268 0 0	12 18 0	50 0 0	218 0 0	*a* 13 7 3	*a* 34 2 7	,, ,,
Roma Co-operative Milling Company, Ltd.‡	1,750 0 0	1,750 0 0	44 18 2	...	1,750 0 0	*a* 137 9 0	*a* 145 8 4	*a* Company promise to reduce this amount this year.
Ditto §	184 0 0	184 0 0	...	...	184 0 0	*a* 13 3 11	*a* 15 5 9	,, ,,
Ditto ‖	138 0 0	138 0 0	...	...	138 0 0	*a* 1 3 0	...	,, ,,
Maryborough Co-operative Dairy Company, Ltd.*	1,164 0 0	1,164 0 0	81 9 0	96 14 5	1,067 5 7			
Queensland Farmers' Co-operative Dairy Company, Ltd., Booval*	1,200 0 0	1,150 0 0	73 2 3	62 17 4	1,082 12 8			
Dalby Farmers' Flour Milling Company, Ltd.‡	1,370 0 0	1,370 0 0	...	...	1,370 0 0	*a*	*a*	*a* No payment yet due.
£	6,956 0 0	6,824 0 0	309 11 6	346 2 1	6,477 17 11	203 19 8	269 12 2	

* Butter factory. † Creamery. ‡ Flour-mill. § Grain store. ‖ Flour store.

REPORT OF THE CHIEF INSPECTOR OF STOCK AND BRANDS FOR THE YEAR 1902.

SIR,—I have the honour to submit the following Report on this Branch of the Department for the year 1902 :—

I.—DISEASES IN SHEEP ACTS.

The number of sheep in the State as at 31st December last, adapted by me to the various pastoral districts from the Registrar-General's returns under "*The Stock Returns Act of* 1893," show the numbers in each of such districts, compared with those of 1901 :—

District.	1902.	1901.	Increase.	Decrease.
Burke	1,081,857	1,153,490	...	71,633
Burnett	27,863	29,842	...	1,979
Cook	21,310	209	21,101	...
Darling Downs	810,790	2,051,409	...	1,240,619
Gregory North	698,210	1,055,031	...	356,821
Gregory South	221,772	108,118	113,654	...
Kennedy	144,830	189,886	...	45,056
Leichhardt	139,246	244,053	...	104,807
Maranoa	712,393	1,046,346	...	333,953
Mitchell	2,087,598	2,783,690	...	696,092
Moreton	7,533	8,867	...	1,334
Port Curtis	58,561	33,821	24,740	...
Warrego	1,183,802	1,321,806	...	138,004
Wide Bay	18,220	4,403	13,817	...
Total	7,213,985	10,030,971	173,312	2,990,298

These figures show a decrease of 2,816,986, or 28·08 per cent., as against a decrease of 2·9 per cent. in 1901.

Compared with the number in the State in 1892, when the total reached 21,708,310, the decrease in the ten years has been 66·8 per cent.

As so many sheep were on the roads at the usual time of making the returns, and, as our inspecting staff has been so heavily retrenched, I am not satisfied that the above figures are correct, and it is hoped that the losses have not been so heavy as above indicated.

The number of sheep introduced by sea and the border during the year was 193,243, and the number that similarly left the State was 140,030, giving an excess of imports over exports of 53,213.

The number of sheep operated on at the various meat-curing establishments was—

Frozen	109,468
Canned	203,089
Boiled and extract	2,951
	315,508
Deduct excess of imports over exports as above	53,213
Total output for the year	262,295

as against 406,181 in 1901.

No disease has been known to exist in the sheep; but, as in previous experiences, where a fresh spring in vegetation follows severe drought, there have been considerable losses in travelling sheep from poisonous weeds. Weeds are the first to appear above ground after drought, several of which, particularly those of a milk-producing character, are poisonous in their incipient stages of growth, notably those of the order Euphorbiaceæ or Spurge family.

The hardships through which sheep had to pass during the drought suggested to me the obtaining of an expression of opinion from men of experience as to the relative hardiness of the merino and crossbreds.

That opinion was unequivocally in favour of the merino in all districts in which the two varieties had been kept.

II.—DISEASES IN STOCK ACTS.

The number of cattle in the State as at 31st December last, arranged into the various pastoral districts from the returns under the Stock Returns Act, courteously submitted to me by the Registrar-General, was as under—

District.	1902.	1901.	Increase.	Decrease.
Burke	622,598	768,497	...	145,899
Burnett	176,014	389,728	...	213,714
Cook	228,120	206,303	21,817	...
Darling Downs	154,076	280,223	...	126,147
Gregory North	104,790	120,842	...	16,052
Gregory South	33,361	15,159	18,202	...
Kennedy	324,206	497,432	...	173,226
Leichhardt	179,704	502,305	...	322,601
Maranoa	70,320	136,361	...	66,041
Mitchell	47,084	30,413	16,671	...
Moreton	286,855	401,313	...	114,458
Port Curtis	117,925	236,399	...	118,474
Warrego	52,406	70,979	...	18,573
Wide Bay	146,012	116,753	29,259	...
Total	2,543,471	3,772,707	85,949	1,315,185

This shows a decrease on the previous year of 1,229,236, or 32·55 per cent.

Comparing this year's returns with those of 1894, when the numbers were 7,012,997, the decrease for the eight years has been 63·7 per cent.

The returns, however, for the past year are, as regards a large majority of the runs, merely given by approximation, as no complete muster has been made for years, and, until a complete muster has been possible, the returns cannot be considered of much value for statistical purposes. It may be the case that in many instances the losses have been overestimated, and *vice versâ*. It is satisfactory to know that the losses in the Northern districts have not been so heavy as anticipated, and that the increase in calves there has been fairly satisfactory.

The number of cattle introduced by sea and land during the year was 11,593, and the exports 35,299, showing an excess of exports over imports of 23,706.

The number of cattle operated on at the various meatworks was—

Frozen	130,689
Canned	44,958
Boiled and extract	2,943
Pemmican	214
	178,804
Excess of exports over imports	23,706
Total output for the year	202,510

As compared with 249,451 in 1901.

The tick fever did not show up with virulence during the year, except on portions of the South Coast, and then only after the breaking up of the drought. In the Gulf districts, where it first appeared, the cattle continue immune, and are only now tick-infested to a limited extent.

On portions of the North-east Coast, however, there has been a recurrence of heavy infestment accompanied by cases of tick fever. It has been found difficult to convince owners in those districts of the beneficial effects of periodical dipping, which are daily becoming more apparent in the Southern and Central districts.

It is probable that, as in the case of sheep scab, it may, ultimately, be advisable to make the dipping of all tick-infested cattle compulsory, as the only means of successfully controlling the pest, but until—as in the case of sheep scab—we have discovered a dip on which implicit reliance can be placed, such a course would not be advisable. Meantime, good work is being done by means of the dipping material referred to in my last report as having been formulated by Mr. J. C. Brünnich, the Analyst to the Agricultural Department—and which, for convenience, we have called the "Departmental Dip."

Much of the time of the Moreton Inspector has been employed in travelling and inducing cattle-owners in the district to construct dips, and in selecting sites, supplying plans, &c., and, although at first with little success, all have now come to see the value of periodical dipping. It is regrettable, however, that in many cases sufficient care has not been exercised in apportioning the various medicaments in dipping material. This cannot be too carefully attended to where arsenic forms the principal ingredient.

The question of permanent immunity of cattle from tick fever has again been brought into prominent notice. Of late, tick fever has appeared in a virulent form in cattle travelled from districts in which they had for years been immune, both from natural and artificial inoculation.

That, however, has been the experience of America, where, as stated in one of Dr. Salmon's able reports, the disease has reappeared in supposed immune cattle that have been removed from one farm to another.

III.—HORSES.

The number of horses in the State at 31st December last, arranged into the pastoral districts, was:—

District.	1902.	1901.	Increase.	Decrease.
Burke	36,165	41,752	...	5,587
Burnett	14,954	30,131	...	15,177
Cook	27,097	30,383	...	3,286
Darling Downs	43,881	55,959	...	12,078
Gregory North	16,791	19,303	...	2,512
Gregory South	7,110	4,642	2,468	...
Kennedy	65,512	67,879	...	2,367
Leichhardt	33,150	43,827	...	10,677
Maranoa	12,903	17,268	...	4,365
Mitchell	19,057	22,238	...	3,181
Moreton	57,002	62,398	...	5,396
Port Curtis	24,228	34,603	...	10,375
Warrego	11,842	12,250	...	408
Wide Bay	29,430	19,486	9,944	...
Total	399,122	462,119	12,412	75,409

The above shows a decrease of 62,997 or 13·63 per cent. on the number of the previous year.

The number introduced by sea (mostly stud horses) and by land was 892, and the number similarly exported 9,271. Those exported by sea were principally shipped to India.

I have made an effort through the inspecting staff to arrive at an estimate of the quality and description of the horses in the various districts. In all the replies, with one exception, the quality of the saddle horse is given as medium to inferior; light harness, inferior; and heavy draughts, good, in the farming districts.

The percentage of the various classes is given as—

Saddle horses	...	66 per cent.
Light harness	...	21 „
Heavy draughts	...	13 „

Of the means of improvement being adopted, it is stated that there is a fair number of good sires in each district, but almost solely of the racing type, with a few Clydesdales and Suffolks in the farming districts; but from all districts comes the complaint that too little attention is given to the selection of brood mares.

IV.—BRANDS.

The number of brands registered during the year was 548, and the total registered up to the end of last year 42,314. The total number transferred was 10,089, of which 754 were transferred during the year. The number cancelled during the year was 160, and the number of cancelled brands re-allotted during the same period was 145.

Very few have taken advantage of the Amending Act of 1898 by registering symbol brands. Many are desirous of doing so, but object to the use of the earmarks provided by that Act. The Law Officers advise that the Act does not empower us to allot fresh earmarks other than those specified by the Act, and a strong and general desire has been expressed in favour of an amendment of the Act, so that more suitable marks may be provided.

In consequence of the great enhancement in the value of stock and the reduction in the inspecting staff, consequent on the heavy losses from drought, it is to be regretted that stock-stealing has become very rife, and many cases of illegally branding and altering and defacing brands have been prosecuted.

Those cases are now prosecuted under sections 447 and 448 of the Criminal Code, and the fines paid into the consolidated revenue. This has shorn the Brands Fund of a considerable source of revenue.

V.—MARSUPIAL BOARDS ACT.

With the close of the year (30th June, 1902) the number of marsupials and dingoes destroyed and bonus on scalps paid for since the inception of the Act (1877) has been 17,378;392, comprising 7,407,863 kangaroos and wallaroos, 9,290,039 wallabies, 460,838 paddamelons, bandicoots, and kangaroo rats, and 219,652 dingoes. The number destroyed during those decades by disease, drought, and innumerable other causes cannot be estimated; but the enormous destruction from those causes has been so great as to enable the boards to adopt more energetic measures for the destruction of the dingo and wild dog, both of which are comparatively little affected by drought.

For the year ending 30th June, 1902, the number of scalps paid for was 281,445 kangaroos, 751,061 wallabies, 30,684 of the smaller kinds, and 21,289 dingoes; total, 1,084,479. This represents a decrease on the numbers for the previous years of 132,547 kangaroos, 65,239 wallabies, 9,833 others, and 3,650 dingoes, or a total decrease of 211,269 scalps. The shortage under the heading of kangaroos is accounted for by the fact that many of the boards are discouraging the presentation of scalps of those animals, as the skins are of sufficient value to render hunting remunerative without the bonus. The fact that of the 31 boards 11 were inoperative for a great portion of the year, owing to lack of funds, accounts to a large extent for the decrease under all the headings.

The Aramac Board again led in the number of kangaroo scalps paid for, with 45,877 as against 123,516 in the preceding year, while the Darling Downs Board paid for 190,716 wallaby scalps, or 217,447 less than during the year ending 30th June, 1901. In paddamelons, bandicoots, and kangaroo rats the Downs Board also showed the largest destruction—viz., 4,966—but 5,147 less than last year's return. The Burnett Board once more accounted for the greatest number of dingoes destroyed, 2,347, and was 209 scalps in excess of the previous year.

The dingo and wild dog are increasing to an alarming extent, and united and energetic action is necessary. In all districts a bonus is (as provided by law) now offered for scalps of these pests, but unless this is backed up by energy and determination on the part of boards and stockowners the extermination of these enemies to sheep and young cattle will be a long and costly process.

VI.—LIVE STOCK AND MEAT EXPORT ACT.

The long-continued drought had the effect of closing down most of the meat-curing establishments for a considerable part of the year, and with the reduced number of stock it is feared that the majority of them will continue inoperative for some time to come.

By permission of the Meat and Dairy Board, and with the concurrence of the Minister, Mr. Robert Ferguson, the surveyor to that Board, visited and reported on the various works registered under the Act, and furnished valuable reports on each. Copies of those reports were furnished to each of the companies respectively, and those who acknowledged receipt expressed their appreciation of the improvements suggested by Mr. Ferguson.

VII.—THE SLAUGHTERING ACT OF 1898.

As previously pointed out, the inspection of the meat supply for the metropolis must, in the absence of public abattoirs, be of only a cursory nature, seeing that slaughtering is carried on simultaneously at some twenty different slaughter-yards, spread over a large area.

With the consent of the Minister, Mr. Robert Ferguson, the surveyor to the Meat and Dairy Board, made a minute inspection of all the slaughter-yards around Brisbane and at various other centres of population. These reports show that, with very few exceptions, the present slaughter-houses are very defective in their sanitary arrangements. In respect of those from which the metropolitan meat supply is drawn, Mr. Ferguson's remarks are endorsed by Mr. Veterinary Inspector Tucker, who superintends the slaughtering of meat for the Brisbane district.

Mr. Ferguson has been good enough to furnish plans and specifications of buildings and fittings of butchering premises of an inexpensive character, as a guide to slaughter-men, architects, and builders of the requirements necessary for slaughtering and handling of meat under hygienic conditions. These plans and specifications will be found as an appendix hereto.

I have, &c.,

P. R. GORDON,
Chief Inspector of Stock.

Brisbane, 5th May, 1903.

APPENDIX.

SKETCH PLANS AND SYNOPTICAL SPECIFICATION OF A MODERN PRIVATE ABATTOIR FOR BUTCHERS.

PREPARED BY R. FERGUSON, SURVEYOR TO THE MEAT AND DAIRY BOARD.

Synoptical specification of a modern private abattoir for butchers who are licensed to slaughter and supply flesh food for human consumption in the city and suburbs of Brisbane. Attached hereto is a sketch lithographed plan for the guidance of architects when preparing plans and specifications which shall be submitted to the Honourable the Minister for his approval before tenders are invited for the work.

Site.

The site of the abattoir building must be approved by the Chief Inspector, and will be satisfactory if selected on a dry and elevated portion of the paddock, at a safe distance from all freshwater creeks and watercourses leading thereto, with the view to prevent the pollution of same from the abattoir premises during heavy and continuous rains. It is important that the site should be fairly level, with falling gradients sufficient for surface drainage to the receiving sewage tank, and to assist the handling of loaded trucks from the slaughter-house to the manure pit, the hide-house, and the boiling department or digester-house, which would be situated from 4 to 5 chains distant from the dressed meat hanging-room.

It is also important that, if possible, the falling gradient should continue from the drainage receiving tank on to land suitable for cultivation, also at a safe distance from fresh water, where the sewage may be pumped, at the minimum cost for steam, for irrigating and fertilising purposes, that horse, cattle, and hog feed may be profitably grown, and the sanitary condition of the whole premises constantly maintained in a salutary and wholesome state, and the atmosphere of the neighbourhood rendered fairly pure and healthy.

Water Supply.

Every site for a butcher's abattoir should have, within a distance of 20 chains, a permanent and reliable freshwater supply from a creek, lagoon, dam, or well, equal to a constant demand upon it of one thousand (1,000) gallons per hour, being the minimum quantity which is considered necessary.

The water would be pumped and forced to the site through a 2-inch galvanised pipe, discharging into a 3,000-gallon tank elevated 25 feet above the floor level, and fixed on a strong hardwood seat, the angle posts being sunk 4 feet in the ground, and securely braced and bolted together.

The delivery-pipe will require to be 2 inches, with 1½-inch piping in the abattoir, with at least four (4) 1¼-inch brass hose connections, and a coil of 1¼-inch hose for flushing and washing purposes generally.

Branches of ¾-inch pipe would lead to all the pens and cattle-yards, fitted with taps discharging into proper drinking vessels, and fitted to receive 1-inch hose connections for flushing the pens and drains in connection therewith daily.

Pens.

The pens for cattle, sheep, and hogs are detached, to the rear of the abattoir at least 30 feet, and connected to the killing enclosures by a race in each case, that specially constructed for cattle being erected of sawn hardwood posts and three rails, close-sheeted vertically on the inside with hardwood tongued and grooved boards, and capped on top.

The floors of all pens and races will be laid with 3 inches of gravel concrete on a layer of 3-inch metal rammed or rolled in close contact with the soil, the gravel concrete on top being finished rough on surface. Surface drains will be laid down in connection with the above to carry off flushing water into the main system discharging into the receiving tank.

Abattoir.

The abattoir building would be designed in accordance with the sketch plan herewith, the dimensions of each department being increased or reduced to meet the present and prospective requirements of the proprietor.

The structure would be erected with sawn hardwood posts, rails, and vertical battens to external walls throughout, as shown, the whole being framed and braced in the best manner, the battens being spaced ¾-inch apart for light and through ventilation, and cut in straight lines ¾-inch from the finished concrete floor.

The whole of the back elevation towards the cattle, sheep, and hog pens and yards will be framed with bottom and top plates and studs, sheeted close on the outside with 6-inch by 1-inch wrot and rebated hardwood or beech chamfer boards.

All gables above the top plates would receive 3-inch by 2-inch studs, and sheeted close with chamfer boards before described.

The hanging tie beams would be of hardwood. Ironbark 10 inches by 4 inches spaced on top of each post as shown, sunk down on plate until a bearing is obtained on top of post inside of the latter, and secured to plate by an 8-inch by ⅝-inch coach screw, and also bolted to rafter.

Roof.

Ridge-valley rafters, common rafters, and collars would be of pine, executed in the best manner, the wide projection at eaves and at gables being supported in straight lines by hardwood 5 inches by 3 inches, wrot and stop chamfered bracket struts tenoned and secured to every post and to rafter and fascia, and fixed double on all angle posts.

Similar struts will be fixed to all posts and hanging tie beams, as shown on sections.

Batten roof for iron 2 feet apart, and cover the whole structure with best quality of iron in a workmanlike manner, fixing ventilators and spouting with all down pipes discharging into surface drains.

Fascias.

Fascias and gable boards would be of 1¼-inch pine, wrot and fixed in the best manner, and with the spouting painted when fixed.

Finish roof with valleys, ridging and flashings all of the best, and fixed in a workmanlike manner.

Loading-shed would be constructed open as shown, with posts, top plates, and rafters all executed in the best manner, the gables being enclosed with 6-inch by 1-inch pine tongued and grooved boards fixed vertically and cut to pattern at bottom.

The fascia, gable boards, battens, irons, flashing, and spouting would be executed in accordance with that specified for the main roof.

Doors.

The doors and gates throughout, as shown, would be framed of hardwood and battened to the rails to match the walls, and fitted with strong hinges and fastenings of forged wrought iron.

Sashes.

Sashes as shown in all gables for light and ventilation would be framed of 2-inch cedar hung on centre pivots of strong make, and fitted with strong sash cord to open and shut same, and belaying hooks fixed to posts.

Poling Pen.

The knocking-down pen would be framed with sawn hardwood 6-inch by 6-inch posts and angles, and 3-inch rails, 2 feet apart, sheeted close both sides with 4-inch by 1-inch tongued and grooved hardwood vertical boarding.

The door to race would be heavily framed of 3-inch hardwood with four (4) 2-inch rails sheeted one side only, with 4-inch by 1-inch boards, before mentioned. This door will lift vertically, running in solid grooves in the posts each side, and would be balanced for easy action by one person with counter weights of iron or lead, steel wire cords, and strong pulleys on each side of posts.

The side opening through which the animals will be delivered on to the hoisting-floor, after being poled, will be of the full width and height of side wall between posts, framed as before, and will hoist vertically by the winch, and would be lowered into position by similar means when the insensible animal was outside, or this door may be balanced by counter weights, wire cords, and pulleys as before.

The angle post of pen on this side would be of 6 inches by 6 inches, going up to the plate level, and tenoned into a 6-inch by 3-inch plate fixed under tie beams and scarfed to wall plate. The door would work up and down in a length of channel iron of light section securely and neatly fixed to posts at each side by ⅜ counter-sunk screws 18 inches apart.

Race.

The walls of cattle race would be constructed of sawn hardwood posts, 7 inches by 5 inches, spaced 8 feet apart, sunk 3 feet in the ground, fixed on a concrete footing, and encased with gravel concrete 6 inches in thickness to above the surface level, mortised to receive 4 rails, in height of 4 inches by 2½ inches, framed within 1 inch of face of post inside, and sheeted close with 4-inch by 1-inch boards as before, and capped on top.

Fence to hog and sheep lanes will be constructed with 4-inch by 5-inch posts, 4-inch by 2-inch rails, and 1-inch battens, spaced 1 inch apart vertically, and cut in straight lines at top.

Fittings.

The hog-scalding tank would be constructed of well-seasoned pine 2½ inches in thickness, and bolted together perfectly watertight, having steam connections with boiler in digester-house, and brass waste to drain.

The scuttling table for hogs, and bleeding tables for sheep, would be strongly framed of pine, the former being neatly covered on top with a strong gauge of zinc secured along edge of top with tinned flat head tacks.

The hangers for the overhead rails would be forged to the form shown, the rail being 18 inches below the soffite of tie beams, the strap of hanger being carried over the top of beams and turned down 1 inch on the opposite side. The strap would be secured to side of tie beam by two $\frac{1}{2}$-inch coach screws $2\frac{1}{2}$ inches in length. The travelling pulley and hook pendant from rail would be of the usual meatworks pattern, forged and cast in this city.

The brackets shown attached to posts carrying the wall rails for hogs and sheep would be forged to detail, and secured by coach screws, as shown, 4-inch by $\frac{5}{8}$-inch.

The hangers for hog rail would be attached to tie beams as before, and stayed by iron straps from same to prevent lateral movement at the lower level.

The section of ironwork in hangers, brackets, and rails will be calculated according to the load that may be carried between the bearings, allowing a safe factor of four (4).

Floors.

The floor of the abattoir throughout, including the loading-shed and the catch pens, will be laid with concrete in the best manner, as follows, viz.:—

The natural surface of the ground being formed to the level necessary, and trenches executed to the proper depth for all drains inside and outside providing for the necessary falls to the main drain leading to the receiving drainage tank, a layer of hard metal broken to a gauge of from 3 inches to 4 inches will be laid down under all floors and drains and rolled and rammed until each piece is solidly bedded into the soil and is closely compacted together to receive the gravel concrete.

The concrete on top of metal in floors and drains will be 3 inches in thickness above the top of metal generally but going down and filling the interstices of same solidly, and will be composed of 4 parts of clean river gravel 1-inch gauge clear of sand, 2 parts of washed coarse sand screened from the gravel, and 1 part of approved Portland cement. The aggregates after being measured will be turned over dry, and twice after being wet through the rose of a water can or hose thoroughly mixed and amalgamated, the pick being used freely for the purpose, until the material is handled into barrows and removed on to the floor or drain.

Prepare for laying floors by thoroughly wetting the metal with a hose or water can with rose, then wheel on planks laid down for the purpose the gravel concrete in a plastic condition, and discharge same rapidly on the face of metal, filling all the interstices as it is raked and rammed true to the section curvature, having a fall of $2\frac{1}{2}$ inches from the centre of building to the side walls in the dressing space and wings, also in the hanging space.

The surface of floors will be rammed and wrot true to section template and straight edge on face floted at once with $\frac{1}{2}$-inch of cement mortar, 1 sand to 1 cement, until sufficiently hard to trowel smooth and fair without exhibiting tool marks on completion.

The floor of killing and hoisting space will fall to the bleeding duct, and the catching pens to the surface drain outside. The floor of cattle race will fall to each side, and the sheep and hog runs and yards generally will have a fall to surface drains of $2\frac{1}{2}$ inches every 10 feet.

The floor of the loading-shed will fall to the surface drain on each side; the centre portion, as shown forming the wagon wheel track, will be laid with wood blocks.

The surface drains, where shown outside the walls of the abattoir, will be formed as shown on sections, the concrete of floors and the outside of drains being retained by pine boards until set, when the face will be finished with cement mortar, as before mentioned, and floted fair and true in straight lines, the plinth being splayed as shown around the structure.

The drains will be formed throughout 10 inches in width with 3-inch concrete on metal similar to floor by 3 inches in depth at the ends, wrot with a fall generally of $1\frac{1}{2}$ inches in 10 feet, the bottom being conical, in form inverted.

The bleeding duct as shown across the building, embracing the three departments, will be of the depth on section to carry the drainage from the outside drains on the sheep side of the structure to discharge into the main drain on the opposite side of the building with the fall specified.

The deep section of the duct will be 10 inches wide, similar to other drains in the centre of the width shown on plan, the 12 inches on each side of drain being finished with a hollow splay down to the edge of same, 3 inches below the floor level.

The drain shown across floor inside between the dressing and hanging space will be of such width and depth as may be determined after, but the cost may be taken similar to the others.

Main Drain.

The main drain will be laid as before specified, 12 inches in width by 12 inches in depth, the bottom being conical in form, similar to the others, the direction selected for the tank giving good and sufficient fall all the way, the top of drain being flushed with the natural surface of the ground throughout.

Receiving Tank.

The receiving tank will be installed at a distance of not less than 5 chains from the abattoir, and will be 14 feet in diameter by 4 feet in clear depth under the surface of the ground.

The walls of the tank will be executed with 9-inch brickwork laid and flushed up solid with cement to 3 inches above the surface level. The bottom will be laid with two courses of bricks set and grouted flush and full at all the joints with cement similar to walls.

The bottom and wall sides of tank will be faced with cement ¾-inch in thickness floted to a fair and true face, and then trowelled close and smooth watertight; the top of wall of tank all around being finished to below the surface of the soil on the outside, both angles being chamfered ½-inch to prevent chipping with the usual wear and tear.

Tramway.

The tramway, as shown inside of the abattoir, and leading to the digester-house, hide and skin departments, and the manure pit, 5 chains distant, would be laid down with 14-lb. steel rails upon 4-inch x 4-inch ironbark sleepers, spaced 24 inches apart. The rails inside the building would be fixed to gauge as the floor is being laid, bedded on the metal and concrete at such depth that the top of the rail will be perfectly flush with the finished surface of the floor, a neat groove being wrot in the cement to receive the wheel flange.

Painting.

The sashes in all the gables would be glazed with 20 oz. best quality of Chance's sheet gloss bedded in oil putty, and neatly back puttied, and finished to the front in the best manner.

The walls of the building, both inside and outside, should be primed as soon as the woodwork is fixed in position, and painted two round extra coats of zinc white and white lead mixed in equal proportions as soon as the roof is finished.

The woodwork of roofs, fascias, and gable-boards, with all timbers of the loading-shed in front, would be primed and painted in a similar manner.

Remarks.

This painting of the timbers is most essential from a hygienic point of view, as the pores of the timbers will be sealed up and absorption of blood and other matter likely to decompose and emit noxious odours prevented.

The painted walls, both inside and outside, may be washed down with the hose daily perfectly clean, as all foul matter will be easily washed off the painted surface.

The flushing and cleansing work in the abattoir would be performed fairly constant when practical operations are going on, keeping a steady current in the drains sufficient to move along all solid matter to the receiving tank, where it will be recovered daily when empty, and carried to the digester-house or the pots.

Hides may only be salted and cured when removed to the distance before mentioned for the digester-house and the drainage receiving tank, and all glue pieces, horns, hoofs, and bones of every description may not be treated or stored at a less distance.

Hog yards may not be installed within a distance of twenty (20) chains from the abattoirs, having proper shelters for the animals, and with the yards and pens floored with concrete and fitted with surface drains and a water supply.

The slaughter of animals before noon in a semi-tropical climate when the temperature is highest—*the general practice*—is most objectionable where chill-rooms do not exist, and the sanitary conditions are imperfect, producing a noxious atmosphere, and blow flies in myriads with putrefactive bacteria in countless multitudes in every cubic inch of space in which the meat has to be hung.

This reprehensible practice, with the transit of meat to the city in open wagons in a hot, flabby, and flaccid condition, the beef quarters with the carcasses of sheep and hogs being piled on top of each other in an indiscriminate manner, and carried at high temperatures during the afternoon daily, should be prohibited by early legislation upon the whole subject.

The killing and dressing of animals of every kind as food for human consumption should be performed late in the afternoon daily, and the meat when dressed and washed down would be carried by the overhead tracking in the new abattoir into the enclosed hanging space, where the air current is cool and wholesome as a result of the hygienic conditions described.

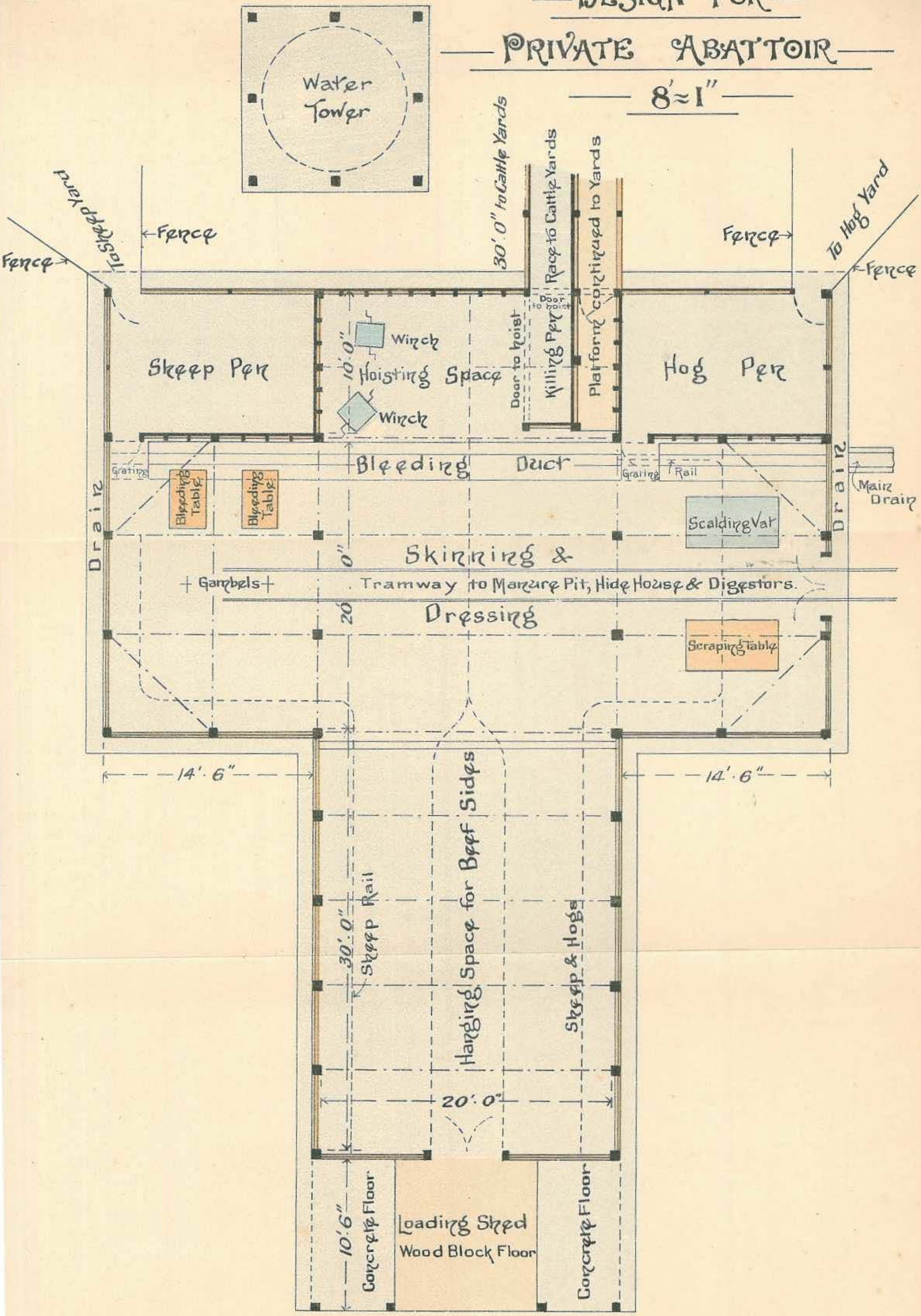
The beef hanging in sides during the night in this satisfactory atmosphere would be sufficiently hardened up at 4 o'clock a.m. to be quartered and carried to the city in specially constructed wagons covered at such height that the beef quarters, sheep and hog carcasses will hang detached from each other and clear of the floor.

This meat when delivered at the market will exhibit a shapely and bright appearance, appetible and wholesome as an article of food, and will hang in a sound condition for several days in a suitable atmosphere.

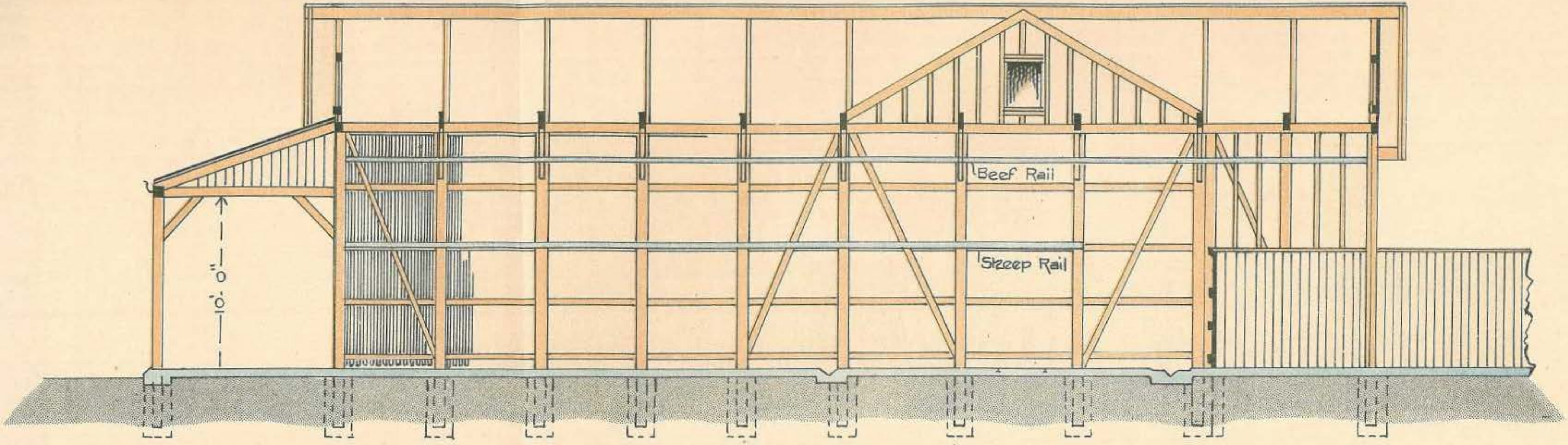
Retail butchers who are not in a position financially, through reckless competition for live stock at the saleyards, to erect suitable and modern abattoirs as described, and carry meat to the city in proper vans for the purpose, can be more profitably supplied with beef quarters and carcasses of veal, sheep, and hogs by the several companies operating meatworks in the neighbourhood of this city, who purchase their stock at from 25 to 50 per cent. under saleyard prices, and realise immense profits from the special treatment and disposal of the by-products.

Master butchers who are financially in a position to instal a modern private abattoir before described, or to convert their present premises upon the lines mentioned, should be permitted to do so in accordance with plans and specifications submitted to the Honourable the Minister for his approval.

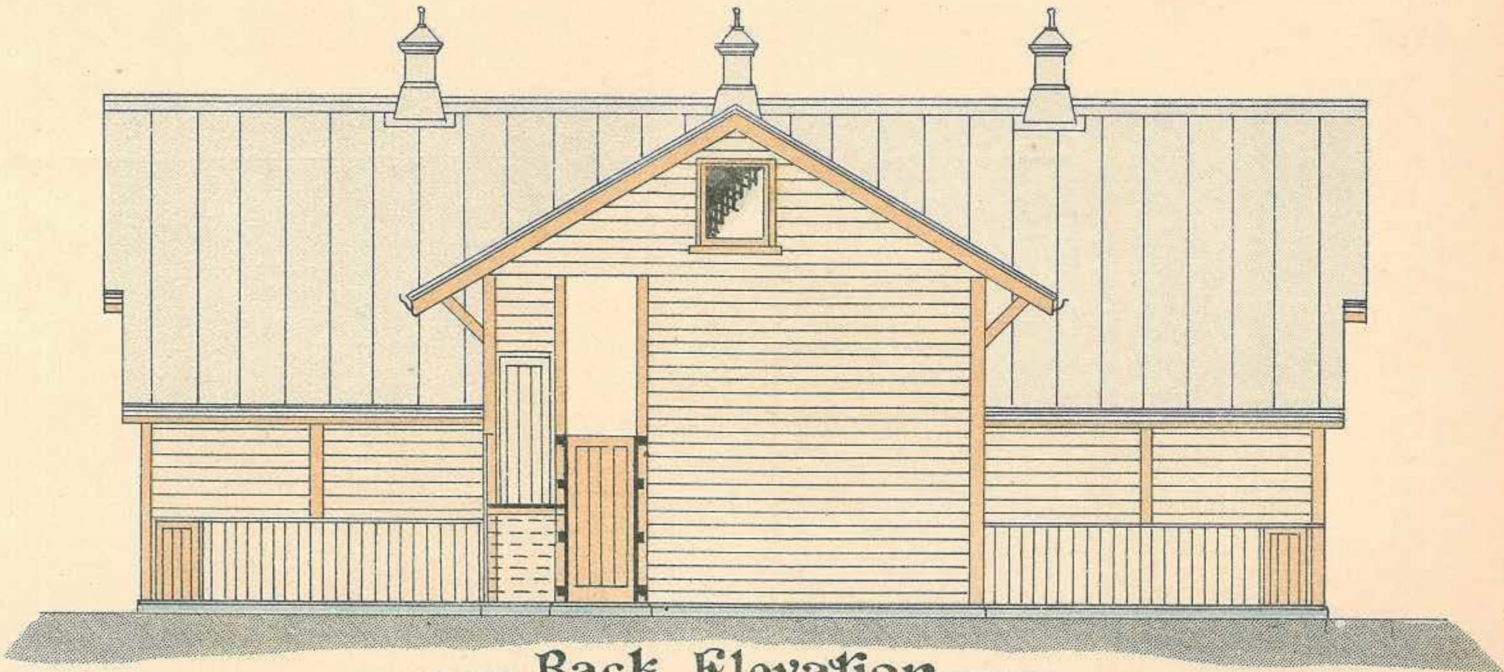
DESIGN FOR PRIVATE ABATTOIR
8' = 1"



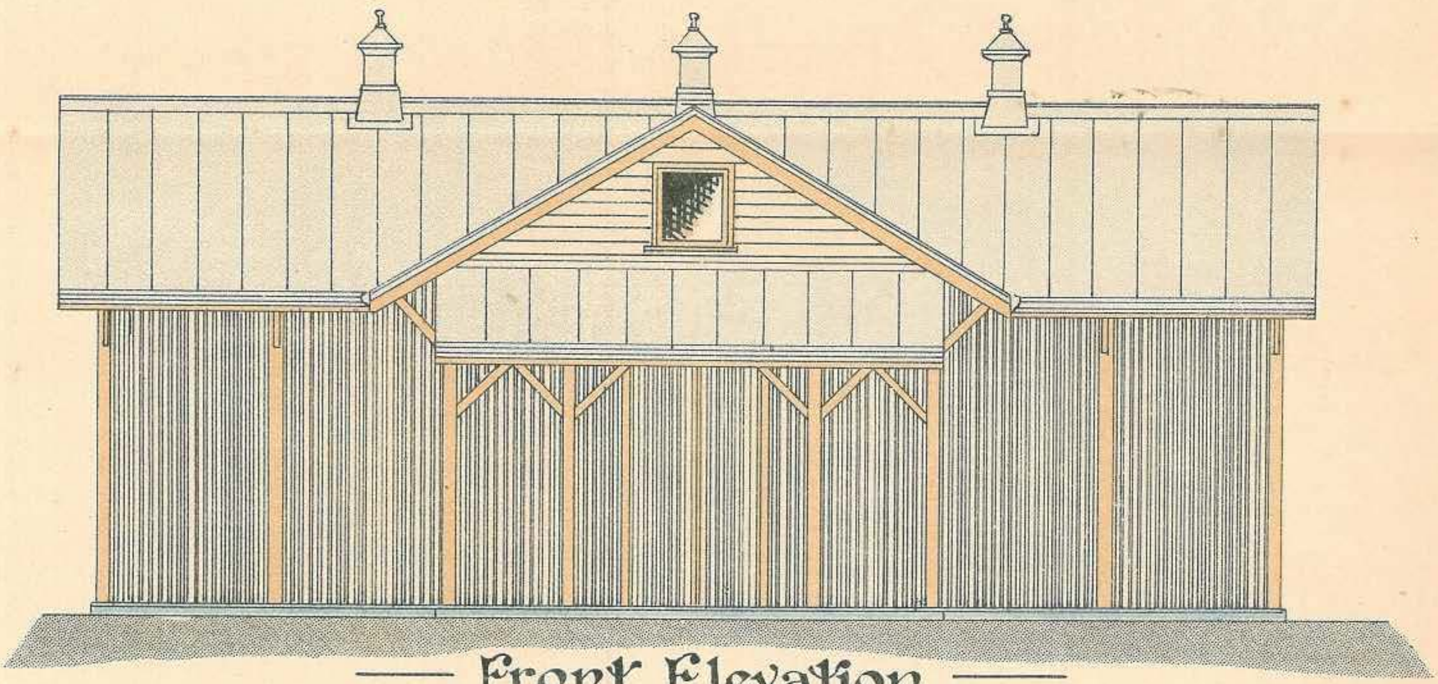
Plan



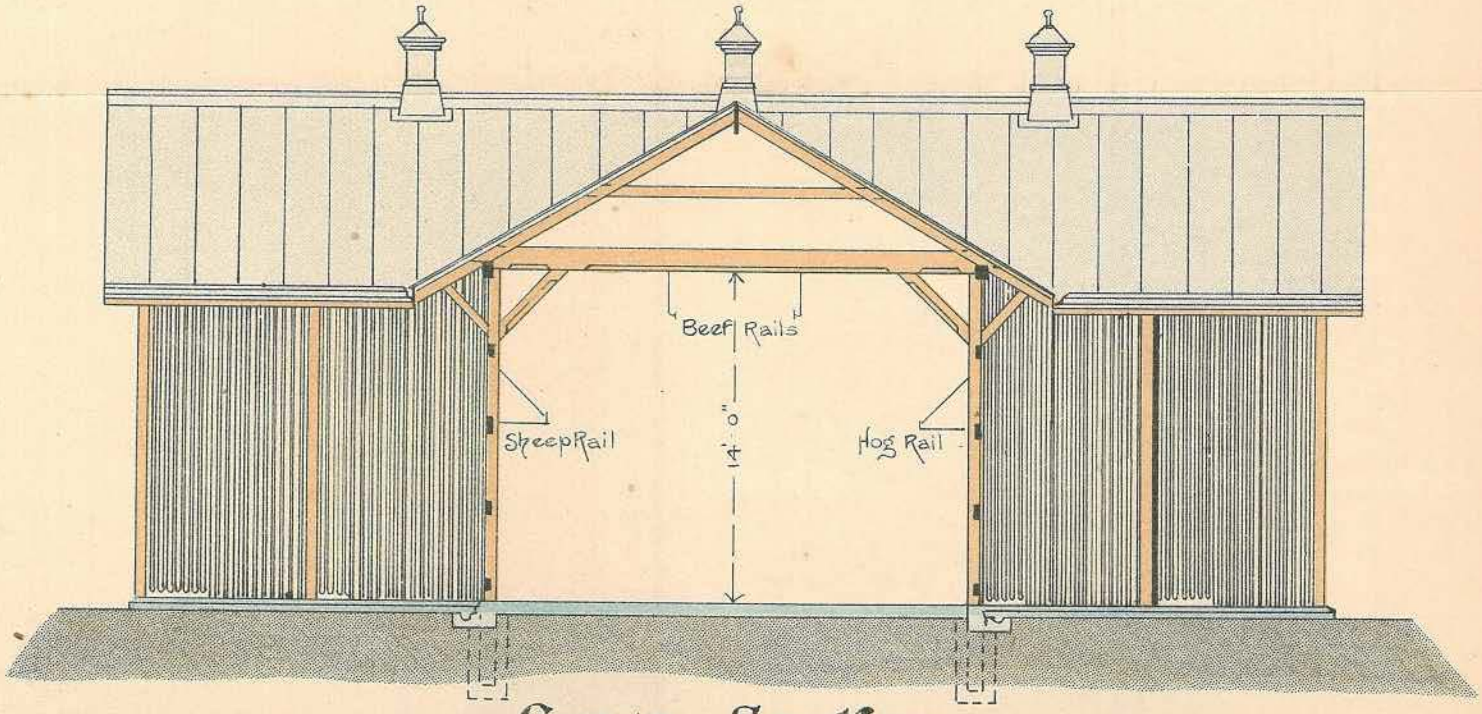
Longitudinal Section



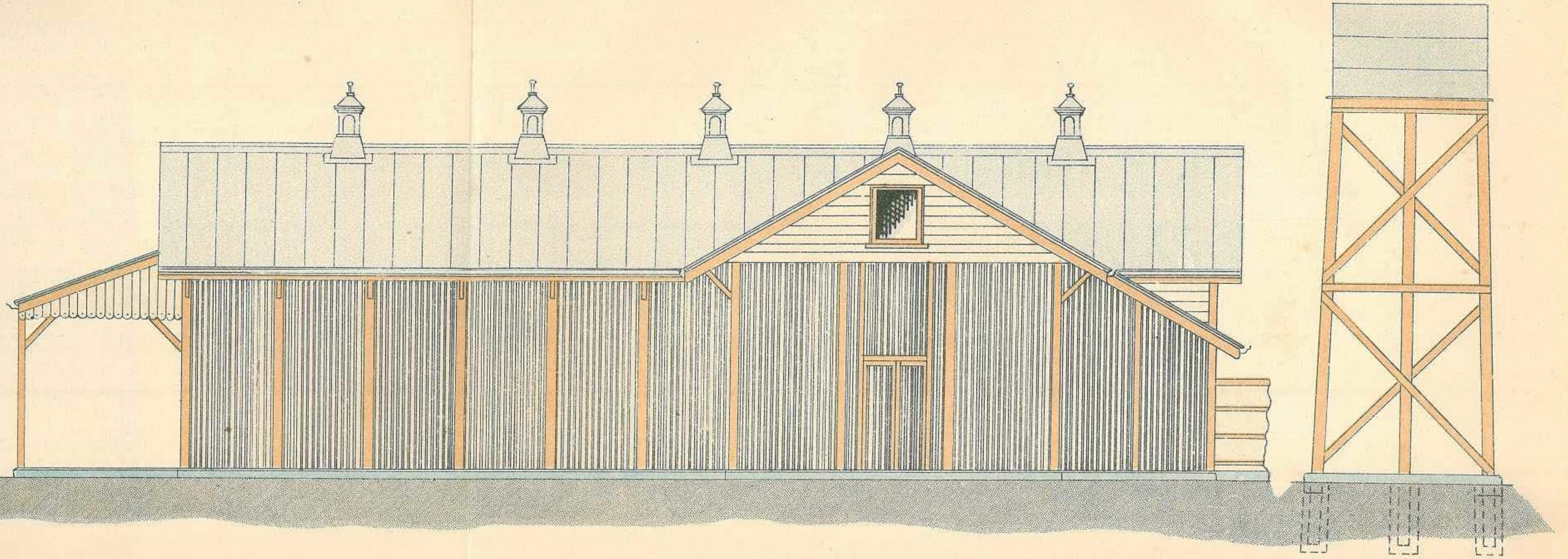
Back Elevation



Front Elevation



Cross Section



Side Elevation

Strippers.

[A WARNING BY THE PRINCIPAL, GATTON COLLEGE.]

As there will be many strippers at work during the coming harvest, a word of warning may be given to the new beginner as regards the ill effects which will surely take place if the machine be placed in the wheat field during a time when the crop contains too much moisture, either from the effects of rain or want of proper ripening of the grain. If the crop be harvested before the grain is properly ripened—i.e., before it becomes hard—it means a pinched or shrivelled grain. If, on the other hand, it be harvested during showery weather, difficulty will be found in threshing, and also a soft and discoloured grain will be the result, which may germinate before threshing. This trouble is not likely to take place with the experienced wheat-grower.

Silos and Ensilage.

"THE FARMER'S ALL!"

BY "KORADJI."

[Abridged from the *Courier*.]

Although the making of ensilage has been demonstrated to be practicable and an important factor in the economy of the farm, it has not, except in a few instances, been generally adopted in Queensland. We have an example this year of what this country is capable of producing in the shape of grass and herbage, and it would seem as if we were ignoring this bountiful provision of Nature should we fail to take advantage of the extra growth by conserving it. Of course such a disastrous season as that of last year might not occur again for many years, but, apart from such intense droughts, there are periods almost every year when it is decidedly advantageous for the dairyman to have a store of fodder for his milch cows. The falling off in the milk supply at a period when the commodity is of most value is a contingency that can be minimised largely by fodder conservation, and the surest manner in which to carry out a reliable system of conserving the surplus growth which covers the country in such profusion, or the field crops raised for the purpose, is by means of the silo. The saving in the milk supply will be found to more than compensate for the cost of the silo and the time in filling it, in addition to the manifest improvement in the health of the cows.

VALUE OF ENSILAGE.

In 1882 several hundred farmers attended a conference in New York to compare experiences regarding the manufacture of ensilage for profit. Among the many opinions expressed by the farmers at that conference, the following may be taken as a fair sample:—

"It will double the stock-carrying capacity of our farms; its advantages to dairymen are incalculable."

"It gives a vigour and healthy appearance not seen in hay-fed cattle."

"We can double the number of stock, and thus increase the value and fertility of the farms."

"It enables one with a little land to keep a large number of stock."

"We believe stock can be kept for one-half the cost of other food, and will fatten as much as during the best grass season."

"Anything of a vegetable nature that animals will eat will make useful ensilage."

"Forty or fifty tons of fodder can be ensilaged off 1 acre, which is worth more than 20 tons of hay."

"The cost of feeding on ensilage as against hay and roots is 1 in 3."

"Cattle can be kept for one-fourth the expense of any other method."

One farmer said:—"I am keeping four times the number of stock with my silos than I have been able to keep hitherto. A silo filled with green fodder in time of protracted drought is invaluable. The profits are very large. I consider my two silos worth £2,000, and would as soon think of doing without my house as without a silo. I would rather pay interest on that sum than give them up. I farm for profit and not for pleasure, and have found the silo the best investment I have ever made."

These are some of the experiences of men who proved the worth of this means of saving fodder for a time when it is most required. The late Mr. Wilson and the present Government Dairy Expert of Victoria, Mr. R. Crowe, prepared a very useful pamphlet on the subject of ensilage-making, and a few extracts from it will be useful just now.

Construction of a Silo.

Local circumstances must determine the kind of silo. Mr. Archer, of Gracemere, Rockhampton, has been very successful in ensilage-making. A silo erected by that gentleman was seen by the writer last year, and it seemed to answer well. It was constructed octangular, with substantial posts, and the opening between the posts filled in with planking. Cheap earthen silos—holes simply dug in the ground—are more likely to popularise the system among the farming community than expensive masonry or other material of a costly character. Where the earth is sound, this plan may be adopted with success.

In some places where plenty of gravel and sand are available, concrete may be advantageously employed. Concrete walls for a silo should be smooth and plump, so as to allow the ensilage and covering planks to go down easily as the mass subsides. The walls and bottom of a silo should be air and water tight. It was thought and recommended at one time that drainage should be provided at the bottom of the silo, but this is a fallacy, as no moisture should escape from the silo; and a drain that would carry off water would allow air to get in, which would do a great deal of damage to the ensilage. It has been said that it makes no difference whether a silo costs £20 or £500—one will preserve ensilage as well as the other when continuous pressure is provided. Small silos, however, cannot be made as effective as large ones, nor can the fodder be packed as well against rough surfaces as against walls that are smooth. Consequently there is more waste of fodder with small pits and rough surfaces than with large silos and smooth walls.

Ensilage has been preserved in good order by simply stacking it. This method has been practised largely in England and in some of the Southern States. Mr. Charles Sealy, of Harrisville, Queensland, also makes good ensilage in the stack. This is the cheapest method of making ensilage, but in a climate like this, with penetrating hot winds and great heat, a considerable quantity of the fodder along the stack must be spoilt. Although the ensilage can be made well in the stack, the loss is sometimes so great that it will repay the farmer to make a silo. Where there is abundance of grass and herbage, farmers who have not the time at present, nor the wish to go to any expense, will do well to put up as many stacks as possible. If they do not require it this year, they might next year, and ensilage will keep in the stack indefinitely.

Filling the Silo.

There are two kinds of ensilage—namely, "sweet" and "sour." It must not be understood that the ensilage termed sour is in any way offensive; it has a pale greenish yellow colour, and a slightly vinous odour. Sweet ensilage, on the other hand, is of a brown colour, and of sweet luscious odour. Sour ensilage has been found to be most suitable for animals producing milk, and sweet ensilage for fattening stock. When it is desired to produce sour ensilage, the crop may be cut when full grown—but before any moisture has escaped—and carted to the silo immediately it is cut, and pressed tightly down. The sooner the silo is filled, and the weights applied, the better for sour ensilage. If the crops are of a rough nature, such as barley, vetches, maize, &c., they should be put through the chaff-cutter, but the finer grasses do not require chaffing. When filled rapidly and immediately weighted, the temperature will seldom exceed 80 degrees Fahr., and little fermentation will ensue.

When it is intended to produce sweet ensilage, the crop may be also cut when full grown; but it must lie a day or two in the field, so that at the time of being put in the silo it contains less than 70 per cent. of moisture. The process of filling should go on slowly, so that the temperature may rise to between 125 and 150 degrees Fahr. Should the temperature not be sufficient, either the fodder has been too wet or the filling and consequent compression has been going on too rapidly. When a sufficient temperature has been obtained, it should be immediately cooled down to below 90 degrees, by applying the pressure, or the ensilage will quickly spoil. Testing the temperature of the silo is a very simple matter. Procure a 12-feet length of common gas pipe, 1 inch in diameter, and have welded to it a steel point. Drive this into the ensilage mass about the centre of the silo, and by means of a glass thermometer and a piece of string the temperature can be tested at various depths.

Mr. J. L. Thompson, late principal of the Dookie College, Victoria, recommends that the filling of the silo should be carried out in such a manner that the layer of fodder should be always horizontal. The filling having been completed, the covering up takes place. The planks should be put across the short way of the silo, planks of 9 inches by 2 inches, hardwood, being found most convenient. At one time it was thought necessary to have the covering as close and air-tight as possible, but this has been proved erroneous. Sawdust, bran, felt, tongued and grooved boards have all been tried, in order to prevent the air from escaping; but the object now is to facilitate the escape of the air by compression, and towards that end it is better to place the planks about a quarter of an inch apart, and half an inch shorter at each end than the silo, so that there will be no danger of their sticking against the walls.

Weighting the Silo.

Mr. Wilson's first experience in weighting the silo was with bags of sand 2 feet deep; but this was not a success, as the bags soon rotted. He then obtained a screw and chain-press from the local blacksmith. The screw is worked by one man, and the total leverage of the contrivance is as 450 to 1, due allowance being made for friction. This appliance is a great saving of labour, especially when a silo is being refilled, as the whole covering can be removed in fifteen minutes. In the absence of any mechanical pressure, the weighting can be accomplished by the material most easily procurable on the ground, and that will give sufficient pressure—namely, 100 lb. to 150 lb. to the square foot. Ensilage can be made in a silo without pressure; but, taking into account the loss of space and ensilage by decay at the top and sides, this system has no advantages to recommend it, as good ensilage has been made in this way as in the most expensive silo. A small farmer need not hesitate to sink a hole in any good ground, put in his green fodder, and cover it up with 2 feet of earth; it will come out green and sweet six or nine months afterwards. Wooden portable silos are now used in England.

Any vegetation that stock will eat in its natural state will make good ensilage, and it will be much improved by the operation, especially if fed to cattle. It is said that cattle assimilate ensilage better than other food, for the reason that the change effected in the silo is nearly or quite that which is brought about in the first stomach of the ruminant animal. Scientific men at one time declared that there was no value in ensilage. The late Sir John Lawes and Dr. Volcker have often given the English farmers gentle warnings that ensilage was not worthy of their attention. Sir John, however, subsequently conducted some valuable experiments as to the feeding value of ensilage, and proved that 50 lb. of ensilage was equal to 84 lb. of good mangolds. Mr. A .N. Pearson, at one time Victorian Government Agricultural Chemist, and now occupying a similar position with the Government of Natal, found by analysis that 2 lb. of ensilage had a feeding value equal to 3 lb. of good hay. This shows ensflage to be of very great feeding value.

Tobacco-growing on the Downs.

By R. S. NEVILL.

As there is a movement to grow tobacco again upon the Darling Downs, a word of advice may be of service to the intending growers. In order to make a merchantable quality, it is essential to take great care in housing and curing, and the old-fashioned open sheds are entirely unsuitable for the purpose, unless they prefer to sun-cure upon scaffolds in the open fields; closed-in sheds, with plenty of ventilation when required, are necessary.

It is not advisable to grow tobacco upon the heavy, rich soils, as the product is coarse and rank. Alluvial soils of fair fertility, and on hillsides where possible, are to be preferred.

Tobacco in the Warwick and Killarney districts, on suitable soils, should follow wheat where it is possible to do so, as the wheat lessens the nitrogen in the soil, and lessens the rankness of growth in the tobacco. The tobacco should be planted close, and topped as high as it is possible to mature it, in order to prevent coarseness; hence I would recommend $3\frac{1}{2}$ feet by $2\frac{1}{2}$ feet, and the topping at 18 to 20 leaves. Coarse, rank tobacco is never of superior quality.

The Markets.

AVERAGE PRICES FOR FRUIT—ROMA-STREET MARKETS.

Article.	SEPTEMBER. Top Prices.
Apples, Eating, per case	9s. 6d.
Apples, Cooking "	...
Apples, American, Eating	15s.
Apples, American, Green	...
Lemons, Italian, per 360	...
Lemons, Italian, per 180	...
Lemons, American, per 180	...
Lemons, New South Wales, per case	5s.
Oranges, Italian "	...
Oranges, Local "	8s.
Oranges, Sydney, (packers) "	7s. 6d.
Mandarins, Local "	...
Mandarins, Sydney (packers) "	8s.
Apricots, New South Wales, boxes (half-gincase)	...
Apricots, Queensland, half-case	...
Plums, half-gincase, American	5s. to 6s. 6d. per 108s
Peaches, half-gincase, American	9s. to 9s. 6d. per 60s
Nectarines, half-gincase	...
Cherries	...
Passion Fruit, quarter-case	7s.
Mangoes	10s.
Pineapples, rough, per dozen	4s.
Pineapples, Queen "	6s. 6d.
Melons	...
Rockmelons	...
Bananas, per bunch	1s. 6d.
Bananas, per dozen	2½d.
Tomatoes, quarter-case	5s.
Papaw Apples, quarter-case	1s. 6d.
Custard Apples, quarter-case	4s.
Granadillas, case	7s.
Seville Oranges, apple-case	3s.
Cape Gooseberries, per quart	3½d.
Pears, American	5s. 6d. to 7s. per 70s
Pears (Tasmanian), quarter-case	...
Rosellas, per sugar-bag	...
Guavas, quarter-case	1s. 6d.

AVERAGE TOP PRICES FOR SEPTEMBER.

Article.		SEPTEMBER. Top Prices. £ s. d.
Bacon	lb.	0 0 8½
Bran	ton	3 13 6
Butter, First	lb.	0 0 11
Butter, Second	"	0 0 8¾
Chaff, Mixed	ton	3 12 0

AVERAGE TOP PRICES FOR SEPTEMBER—*continued.*

Article.		September. Top Prices.
		£ s. d.
Chaff, Oaten	ton	5 9 0
Chaff, Lucerne	"	3 8 0
Chaff, Wheaten	"	4 13 6
Cheese	lb.	0 0 6⅘
Flour	ton	12 10 0
Hay, Oaten (Imported)	"	6 18 0
Hay, Lucerne	"	2 0 0
Honey	lb.	0 0 2¼
Rice, Japan (Duty paid)	ton	21 0 0
Maize	bush.	0 3 3¼
Oats	"	0 3 10¼
Pollard	ton	4 2 0
Potatoes	"	6 0 0
Potatoes, Sweet	"	1 19 0
Pumpkins	"	1 10 0
Sugar, White	"	20 10 0
Sugar, Yellow	"	17 10 0
Sugar, Ration	"	15 10 0
Wheat	bush.	0 5 9
Onions	cwt.	0 3 10¼
Hams	lb.	...
Eggs	doz.	0 0 8¼
Fowls	pair	0 4 2½
Geese	"	0 6 1½
Ducks, English	"	0 5 0½
Ducks, Muscovy	"	0 5 9
Turkeys, Hens	"	0 9 1½
Turkeys, Gobblers	"	0 16 0

ENOGGERA SALES.

Article.	September. Top Prices.
	£ s. d.
Bullocks	10 17 6
Cows	7 11 6
Wethers, Merino	0 19 9¾
Ewes, Merino	0 16 1½
Wethers, C.B.	1 1 9
Ewes, C.B.	0 12 6
Lambs	0 16 4
Pigs	...

Orchard Notes for November.

By ALBERT H. BENSON.

The earliest varieties of summer fruits will be ready to market during November; and, as this is the beginning of the season, I beg to call the special attention of every fruitgrower in the State to the importance of gathering and destroying all fly-infested fruits now if he wants to save any crop at all, as the neglect to destroy the first crop of flies will result in the loss of the succeeding crops of fruit. It is impossible to over-estimate the importance of destroying the early crops of fruit flies, as if left alone they breed so rapidly that the fruit crop is soon infested and destroyed.

The best way of destroying the first crops of flies is to gather and boil all infected fruit; such fruit, when boiled, to be fed to pigs or other animals. Feeding the fruit without boiling will result in the escape of a number of the maggots, and is therefore undesirable, besides being contrary to the Regulations of the Diseases in Plants Act.

Every fruitgrower should make it his business to see that his orchard is kept free from this pest, and not only his own orchard, but that his neighbours keep their trees free as well. All useless trees, such as inferior seedling peaches, guavas, &c., growing by hedge or fence sides, should be destroyed, as the fruit is valueless, and only becomes a harbour and breeding-ground for the fly. Unless fruitgrowers take action—combined and systematic action—to deal with this pest, it will never be kept in check; and for such action to be effective, it is best to destroy all trees that produce unsaleable fruit, and to concentrate one's energies in keeping such trees clean that produce fruit of such a quality that it will command a ready sale. The marketing of fruit is a matter also that requires much more care and attention than is usually bestowed upon it. In many instances really good fruit is completely spoilt by carelessness in gathering, handling, and marketing, and is consequently valueless; whereas, had it been carefully gathered, properly graded for size and ripeness, and packed in such a manner that it will carry well without bruising, and when opened up show to best advantage, it would have realised a satisfactory price. First-class fruit always pays to be well handled and well packed, as for such fruit there is always a good demand; but for badly handled, undersized, and bruised fruit there is little if any demand—at any rate, at remunerative prices. First-class early peaches, such as the Alexander or Brigg's Red May, grown on the Downs, would pay to be carefully wrapped in tissue paper and packed in trays holding one layer of fruit, as, if marketed in such a manner, they could be placed on the Brisbane market in first-class condition, and would realise good prices. First-class apricots, such as the Moorpark, would also pay to be handled in the same manner. Fruitgrowers should bear in mind that the better condition in which they market their fruit, and the more attractively it is got up, the better the chance of its realising a satisfactory price.

During the month, the Orchard should be kept well cultivated, especially in districts where the rainfall is light; and in such districts, if water is available for irrigation, a good watering should be given to all fruit trees and vines. By a good watering I don't mean damping the surface but giving the soil a thorough soaking, as one good watering is worth a dozen small ones. Attend to the summer pruning of all young trees, removing any superfluous branches and pinching back all strong growths. Attend to the cultivation of the nursery; stake all grafts or buds, so as to produce straight, well-grown trees, the bud or graft being topped at the height that it is wished to form the head of the future tree.

Farm and Garden Notes for December.

FIELD.—The grain harvest will now be nearing completion, and it is to be hoped that the magnificent yield that has been predicted will be fully realised; but it is feared that the heavy rains experienced in some parts of the grain-producing districts will somewhat diminish the expected return. The estimates of the crop have been varied, and have run from 2,000,000 bushels up to 2,900,000 bushels; but, if a fair average between the highest and lowest be realised, Queensland will have no cause to regret the efforts that were taken to renew the cultivation of grain-producing crops, after the effects of the drought of last year.

Given favourable weather, maize, panicum, imphee, Kaffir corn, and sorghum may be sown, and arrowroot, ginger, and sweet potatoes planted.

KITCHEN GARDEN.—Gather cucumbers, melons, vegetable marrows, and French beans as soon as they are fit for use. Even if they are not required, still they should be gathered, otherwise the plants will leave off bearing. Seeds of all these may still be sown for a succession. Tomatoes should be in full bearing, and the plants should be securely trained on trellises or stakes. Take up onions, and spread them out thinly on the barn floor until the tops wither sufficiently to pull off easily. They should then be graded into sizes, and sent to market or stored in a cool dry place. Where there is an unlimited supply of water and shade can be provided, lettuce and other salad plants may still be sown.

FLOWER GARDEN.—Keep the surface of the land well stirred. Do not always stir to the same depth, otherwise you are liable to form a "hard pan," or caked surface, beneath the loose soil. Alternate light with deep hoeings. A few annuals may still be planted, such as balsams, calendulas, cosmos, coreopsis, marigold, nasturtium, portulacca, zinnia, and cockscomb. Plant out whatever amaranthus may be ready. They may still be sown in boxes. Clear away all annuals which have done flowering. Bulbs should have all the dead leaves cut away, but the green leaves should not be touched. Stake chrysanthemums, and, as the flower buds develop, give them weak liquid manure. Coleus may now be planted and propagated from cuttings. Dahlias are in various stages, but the greater part will have been planted by this time. Give them liquid manure, and never let them dry up. Lift narcissus about the end of the year, but do not store them. Plant out at once in their new positions. Top dress all lawns.

The Blackall Range.

IN no part of the world does the transformation of the vast silent forest into the busy location of man take place quicker than in the United States of America and in Australasia.

Twenty years ago that rugged range of mountains forming the scrub-clad watershed between Brisbane and Gympie, which was named the "Blackall," in honour of one of the most popular of Queensland's Governors—Colonel Blackall, whose remains rest beneath a handsome monument in the Toowong Cemetery—this range was clad from summit to base with extensive virgin scrub. The only sounds which disturbed the solemn hush which then reigned throughout these vast solitudes were the scream of the cockatoo, the melancholy crying of the catbird, the crash of the giant cedars, pines, and beech-trees as they fell before the axes and saws of those pioneers of civilisation—the timber-getters—and the resounding crack of the bullock-driver's whip, urging his unwieldy team through the tangled scrub, stimulating their flagging energies by a voluminous use of a vocabulary *sui generis*, which the rugged and precipitously steep bush tracks called into requisition at very frequent intervals.

As time went on, and the stories of the timber-getters, describing the marvellous richness of the soil, reached the ears of farmers and fruit-growers below the Range, first one then another adventurous spirit set forth to spy out the capabilities of the country and its adaptability to farm settlement. These quickly satisfied themselves that the resources of the Range with respect to soil, timber, water, &c., had not in the least been over-rated. Accordingly, undaunted by the want of roads, the absence of railway communication, and the inevitable necessity of having to carry all stores, provisions, &c., for some miles on their backs, through dense scrubs, where the whole journey was a perpetual toilsome climb, they took up the land in homestead selections, and, transferring their *lares* and *penates* to the new location, set vigorously to work to literally carve out a home for themselves in the wilderness.

In an article on the Blackall Range published in the *Journal* in January of this year, we fully described the great trials and difficulties under which those pioneer farmers laboured, who to-day are, to a man, independent. After years of weary battling with the forces of Nature, they have come out victorious, and now contentedly enjoy a life of ease, rendered doubly enjoyable by the recollection of so many labours successfully overcome.

In those early days the land was of little value—the district practically unknown. To-day the value of land has risen to as much as £10 per acre. Roads have been made, the tramway has reached the top of the Range, and by the time this number of the *Journal* reaches the hands of our readers the whole of the line at present authorised—that is to say to the head of the Maroochy River, three-quarters of a mile from the Mapleton Post Office—will have been completed.

The Tramway.

At our last visit to the Range early in the year, the directors of the Nambour or, as it is called, the Moreton Central Mill Company had carried a tramway a certain distance in three directions. The country through which the Range line was carried presented some obstacles to the construction of a cheap line The result was that when the foot of the Range was reached all the money available for the work had been expended. The line, stopping where it did, was useless for any but those farming at the foot of the Range; but there were hundreds of acres under sugar-cane and other crops on the table-land above, and many thousands of acres which the owners were willing to sell or cultivate. For these the tramway was of no value whatever, and as the road from Nambour Mill to Mapleton is one of the worst, if not *the* worst, in the whole of Queensland, owing to its having been carried over the steepest hills instead of running round them, as it should have done had only reasonable foresight been exercised in planning a route, the whole of the table-lands, which are richer than any other portion of the district, remained in their primeval condition, with the exception that several fruit-growers had cleared their land and planted trees and strawberries. These brought their fruit to Nambour and Woombye on horseback or in wagons; but for the cane-grower there were no means by which he could carry such a heavy, bulky crop down the Range (Plate XXVIII.)

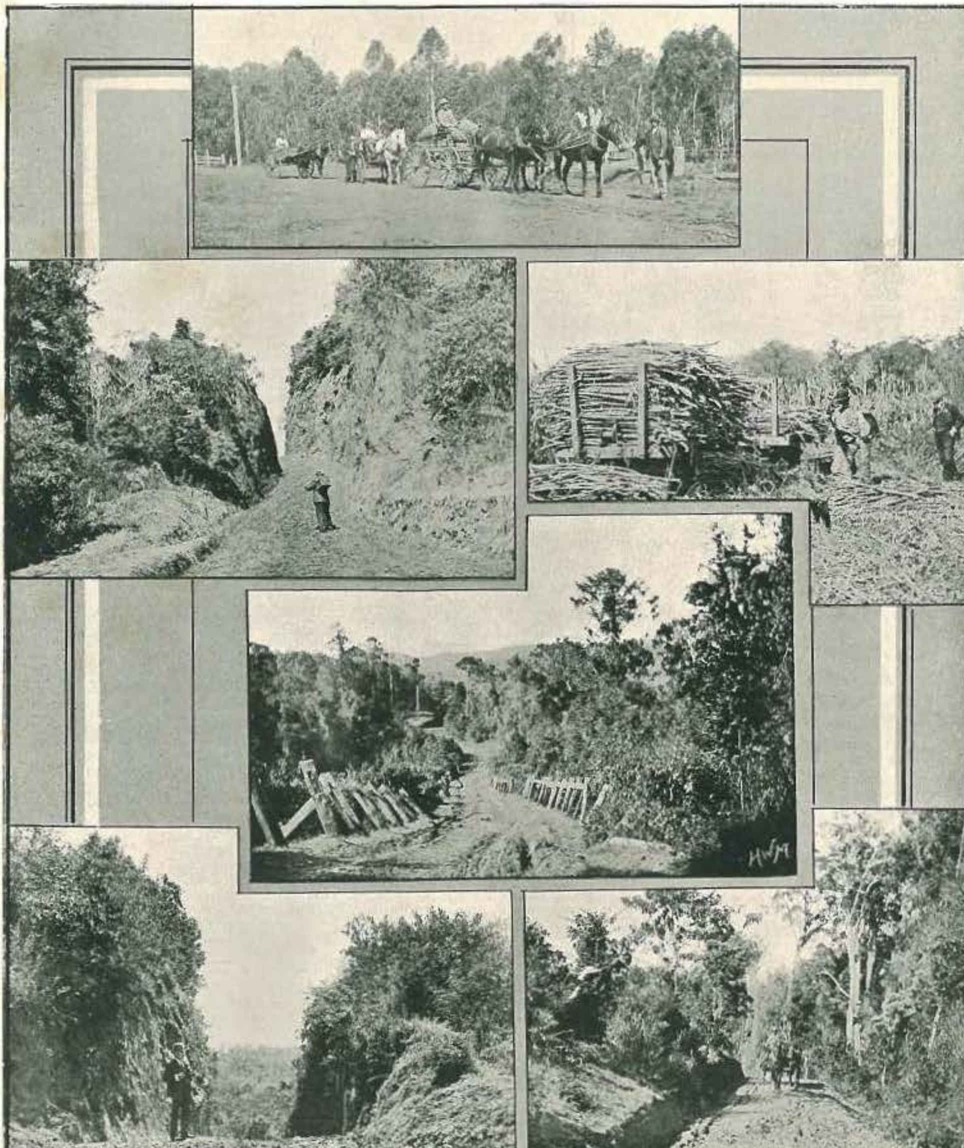
At last it was decided by the Government to authorise the continuance of the line as far as the head of the Maroochy River, on the table-land, making the line about 7 or 8 miles in length. It is this extension which will be completed in November, or at any event not later than Christmas. The engineer in charge of the construction is Mr. Mackenzie, and he certainly deserves the greatest credit for having accomplished so difficult a task as running a tramline through a dense scrub, over deep gorges and round precipitous mountains, where he had to make four separate surveys, cutting his way laboriously through each, only to find some insuperable obstacle which compelled a fresh start. The fourth line tried was successful. As all deep cuttings are avoided, the line winds round the sides of the hills till it reaches the top, and nowhere is the gradient steeper than 1 in 42 on the so-called level land and 1 in 25 on the steepest part of the Range. A weight of 4 tons is easily taken up by four horses. But horses will be a thing of the past, probably before this appears in print, as Mr. Mackenzie has purchased a motor driven by an oil engine, which will be able to take up heavy loads at a speed of either 3 or 5 miles an hour as may be required (Plate XXIX).

Rapidity of transit is not desired so much as reliability and punctuality, combined with a certainty that produce placed on the trucks above the Range will reach the sugar-mill or the railway station at specified times. The line is of 2-feet gauge, and is well and solidly constructed. The curves are necessarily very sharp, but the fact of a trolly having come down at the rate of nearly 20 miles an hour is a sufficient guarantee of the safety of the line. The cost has only amounted to a little over £800 per mile, but this includes about £300 for the purchase of the motor. The expense of driving the motor will be a mere fraction of the expenses attending the use of a locomotive. As there is not a drop of water along the line, it would be necessary to erect watering stations and draw the water to them, as small locomotives cannot carry any considerable supply with them. Then, the train drawn by a locomotive would necessitate the employment of an engine-driver, a fireman, and a guard. Taking rough figures, the cost of the two machines, when at work, would be 16s. 6d. per day for the motor and £2 12s. for the locomotive. We had hoped to see the motor at work, but it had been sent to Brisbane for some alteration to the clutches and had not been returned when we left.

There is now a good prospect of another tramline being built from the Buderim Mountain to Nambour. The Buderim is the best-known portion of the Range, and has long been celebrated for its fruit and coffee. We hope to be able to visit the Mountain at an early date. It may interest some of our readers to know the direction this line will take if built.

According to the *Moreton Mail*, the following is reported to be the route proposed for the tramway from Buderim to Nambour:—Starting at Mr. J. K. Burnett's store on Buderim Mountain, thence through subdivision 1 of portion 47, and portions 48, 140, the corner of portion 142, thence through 116, 133, and 120, crossing Eudlo Creek at portion 175, through 108A, corner of 126, and through portion 123. At this point the new line would join the Moreton

Plate XXVIII.



MAIL COACH FROM NAMBOUR TO OBI OBI.'
DEEP CUTTINGS ON THE ROAD.
LOADING CANE ON TRUCKS.

Plate XXIX.

The Nambour-Dulong Tram-line—Foot of the Range.

Central Sugar Mill Company's tramway. The benefited area would start on Paynter's Creek at portion 139; thence down to junction with Petrie's Creek; thence along Petrie's Creek and Maroochy River to the heads, round to Mooloolah River and timber reserve No. 61; thence including portions 4, 28, 60, 201, 156, 64, 197v, 182v, 183v, 188v, 189v, 208, 102v, 94v, 9, 81v, 41v, 43v, and 123v to the point of commencement.

The country through which the Nambour, Dulong, and Mapleton line runs is level for 2 or 3 miles, and the land on either side is cultivated with sugar-cane. As the line rises, more sugar lands are tapped, and a branch runs away to the rich lands cultivated by Russian Finns, whose settlement has received the name of Finnburg. At the time of this, our second visit, the sugar-mill was in full work, and cane-cutting was going on merrily on all sides. Heavily laden trucks were running down the line of their own impetus, and it was rather awkward to meet one of these "rakes" of six or eight trucks carrying a total of 20 tons of cane, when the meeting occurred in a narrow sideling, with a deep gorge yearning to receive a victim, only 6 feet from the line. What might have proved a fatal accident happened as we were riding up the worst part of the line.

Mr. Mackenzie, the engineer, was riding ahead, we came next, and the *Journal* artist followed. Mr. Mackenzie was carrying a camera in one hand. At a sharp turning we came across a rake drawn by three horses. As we could see no escape if the trollies hit a horse, we jumped off our animal and led him as close as one dared to the edge of the precipice. Our artist wisely reined in and awaited events. Mr. Mackenzie tried to pass, but the rake horses objected, and began to "play up," with the result that the engineer's horse got tangled up with the rake horses, and his two hind feet got over the side of the embankment. Everyone expected a dire catastrophe, but the man of science managed to get his horse up on the line again and clear of the rake. He never lost his nerve, nor did he drop the camera. All he said was, "You see, I've got no nerves, so it was all right."

For the last mile or so, the line makes a succession of curves—all heavy cutting being avoided. Everywhere the eye looks down to vast depths, down which a fall would inevitably be fatal. We stated, in our last account of this wonderful little line, that it recalled to our mind the railway and country between Cairns and the Barron Falls. The similarity is still greater on this latest completed portion of the line. Before leaving the subject, we will mention that a trolly had been placed at our disposal by the engineer and mill manager, the courteous Mr. Lunn of wagonette-wheel fame. We were to do the return journey at whatever time suited us, without waiting for a man or a rake of trucks. When we decided to return, our artist, Mr. Mobsby, elected to drive, or rather to brake. Of course, we had no horses. We were going to run down an incline all the way. As an artist, we have the deepest respect for him, but as a motorman our respect has considerably diminished. We sat in front to signal when to slow up. We started. Whether our signals were misunderstood, or whether our motorman wished to break the record for speed, we cannot say; but the speed at which we raced round curves, in spite of our frantic yells and signals, was blood-curdling. No sooner did a deep gorge appear on our left than the brake was released, and we travelled at 20 miles an hour round those curves. We were thankful at the end of a quarter of an hour (the time we took to do about 4 miles) when the level country was reached, and our artist had to get off and push.

Nambour.

This township is progressing at a rapid rate. New buildings, one of them a two-storied store, are going up everywhere. Good roads have been constructed, unfortunately, only about the town. The very worst bit of road between Nambour and Dulong is not a mile out of the main street. The Moreton Central Sugar Mill was in full swing crushing the farmers' cane, taking the frosted cane first. The scene at the mill, on the tramway, and on the fields is very animated, all working at high pressure to get the cane off as quickly as possible. The frosted cane will probably give poor results, the density being only from 5 degrees to 7 degrees Beaumé. Crushing ceases at 6 p.m., as there are no appliances for working night and day, but centrifugalling is carried on to a very late hour. Crushing will probably be carried on right up to Christmas, as large quantities of cane have yet to be cut on the Range, at Finnburg, and at Petrie's and Paynter's Creeks. From 250 to 300 tons of cane are crushed daily. The hotel is under a new proprietor, Mr Winterford, one of the most expert rifle shots in the State. He went home with a rifle team to Bisley, and came back loaded with medals and trophies. He also went to South Africa and did good work there for nine months with his contingent. We do not often tell anecdotes in this *Journal*. Our space for instructive matter is all too limited, but we will tell one about Mr. Winterford's experience in that country. His company, with another, was camped on the veldt, and rations were very scarce. One man contributed a biscuit, another a bit of biltong, again another had a potato. Between them all they managed to raise enough to make a potful of stew. Winterford wanted to boil a billy at the only fire which could be raised. A branch of a tree had been carried by one trooper for several miles in this woodless country, and this branch was duly put on the fire. The stewpot rested on one end, and the other projected a foot or two. Every sentry watched that pot with anxious care. The stew was nearly ready when Winterford came and asked permission to boil his billy. Permission was readily granted; but, alas! as the sergeant approached the fire, he struck the projecting end of the branch and away went the stew. The little fire was put out—the stew lost. The subsequent proceedings had no more interest for Mr. Winterford. He made tracks for a remote company of Imperial troops, annexed a horse, and before night was miles away from the scene of the disaster.

THE ROAD TO MAPLETON (Plate XXVIII.)

Arrangements had been made with Mr. T. D. Smith, the then secretary of the Mapleton Fruitgrowers' Association, to convey us to Mapleton and to guide us about the district. Thus it was that at 10 a.m. on a certain day we found ourselves on the road in the comfortable wagon of Mr. D. Smith, who may well be called the "Father of Mapleton." The distance from Nambour to Mapleton is about 9 miles, and it will give the reader some idea of the nature of the road when we state that it took three hours to get over the journey. Some of the pinches have a grade of about 1 in 2, and on some of the flats the wheels sank almost to the axles. But we had a splendid staunch horse, who has travelled the road so often that he can be trusted to get safely home, even if the driver be asleep all the way. Arrived at Mr. Smith's orchard, we were hospitably made welcome by the genial housekeeper, Mrs. Ward. In the evening some of the neighbours came in, and arrangements were made to give us a good insight into the workings of

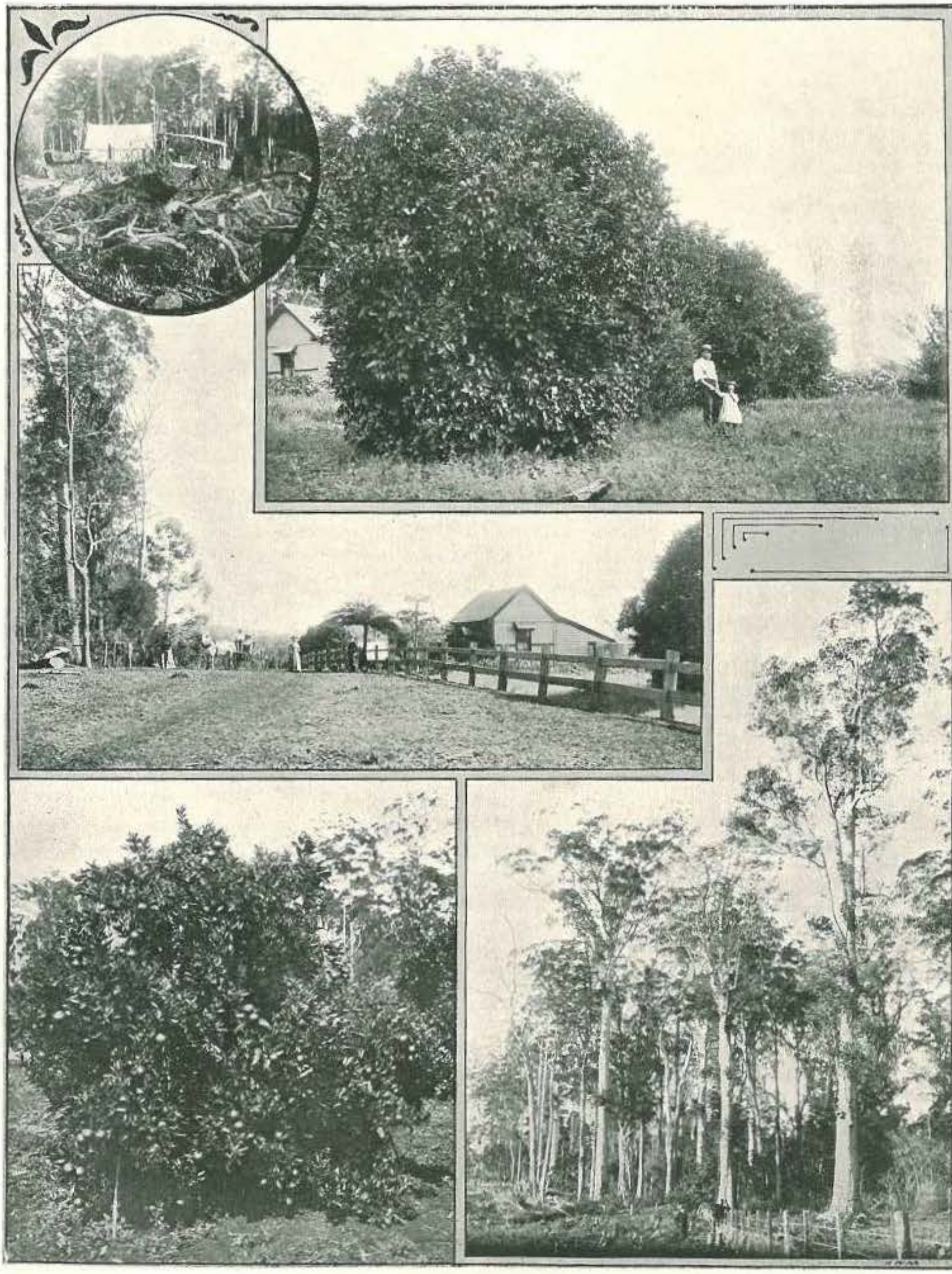
THE MAPLETON ORCHARDS.

It should have been stated that on the road up we passed Mr. Phillips' orchard. He has a quantity of orange-trees growing, but the locality does not appear to be well adopted for citrus fruit-growing. The strawberry garden, however, bore ample evidence of good returns. Birds, here as elsewhere on the Range, are a great nuisance to the strawberry-grower. Hence guns, whips, and scarecrows are everywhere employed. Here we saw a very excellent scarecrow, whose appearance ought to be sufficient to deter even human bipeds from petty larceny.

MR. D. SMITH'S ORCHARD (Plate XXX.)

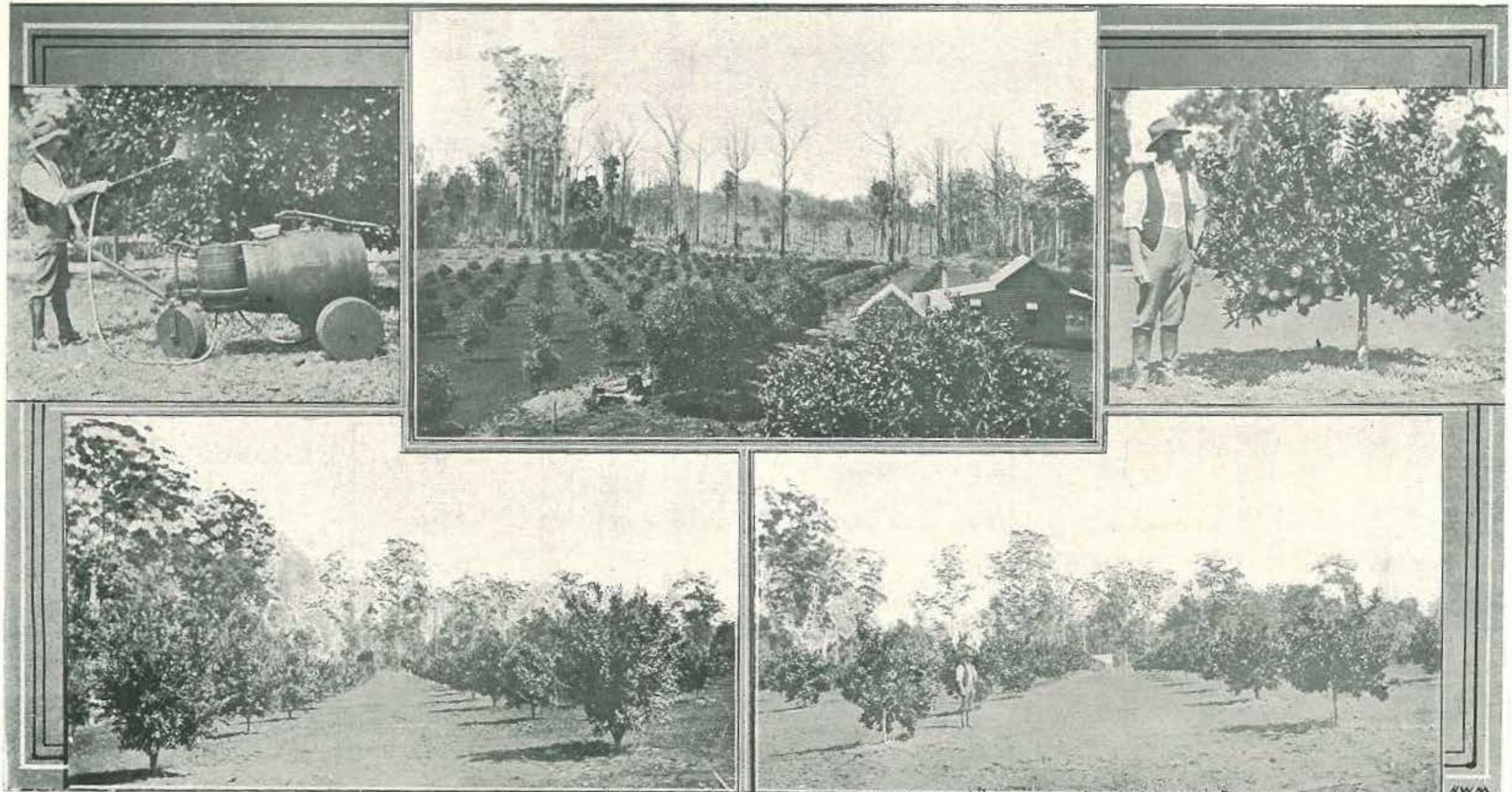
We have already related the trials and troubles of the first settlers in this district, of whom Mr. Smith was one. He took up a homestead on the red soil which was very heavily timbered with flooded gum and tallow-wood principally. Although so densely timbered, it was more of a bastard scrub than a true scrub, which made it all the harder to clear. The timber, as a rule, in this part of the

Plate XXX.



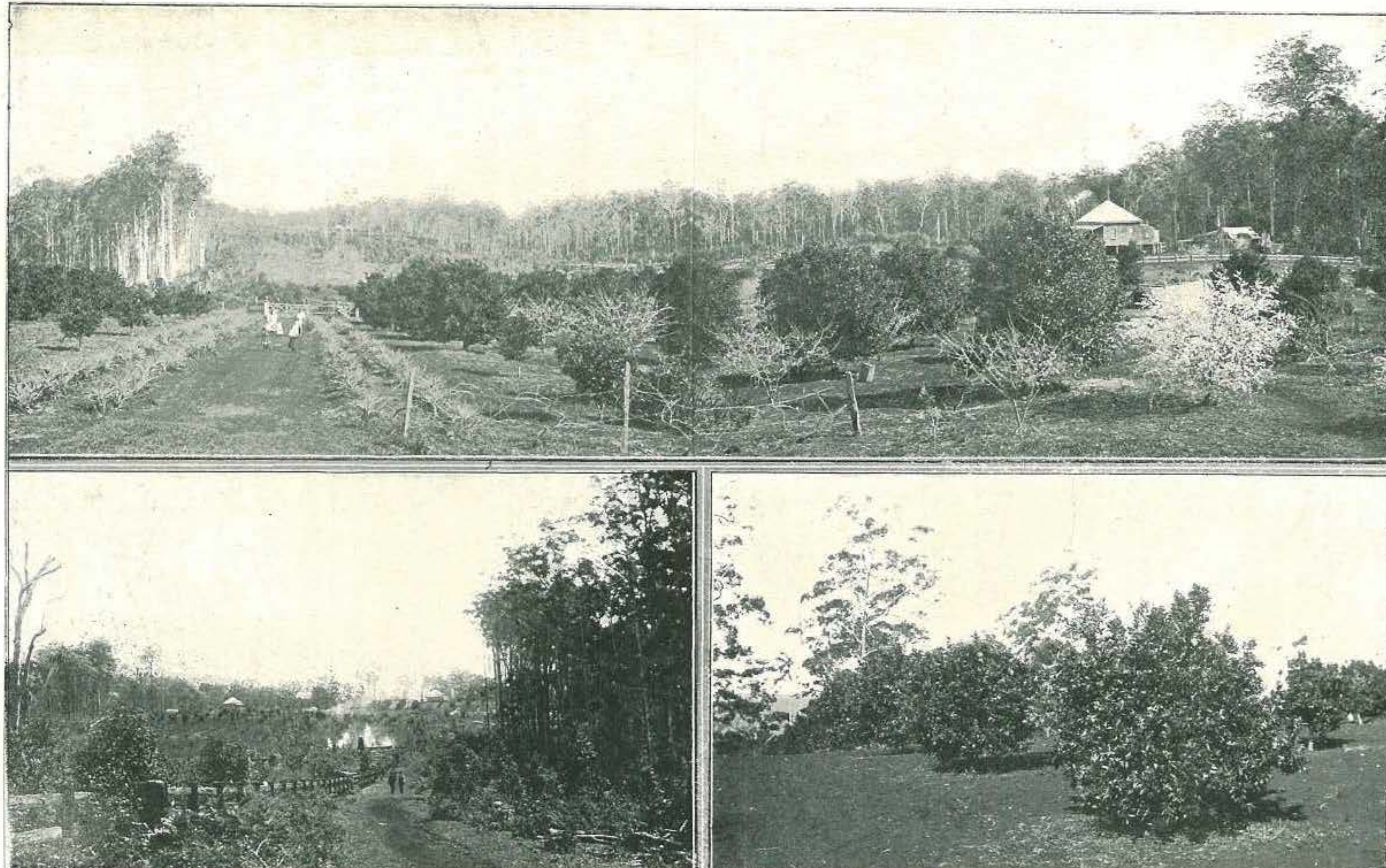
Mr. Wilson's Clearing, and Mr. D. Smith's Orchard, Mapleton.

Plate XXXI.



Mr. T. D. Smith's Orchard, Mapleton.

Plate XXXII.



Range is of enormous size and of great height, running up as straight as gun-barrels to 150 feet to the first branch One tree Mr. Smith measured after it was felled reached a length of 77 yards or 231 feet. The soil is very rich and of great depth. In a 40-foot well, we observed the red soil to extend to a depth of 30 feet, after which the soil was black. There are 250 orange-trees, besides plums and persimmons, in the orchard, as well as a plantation of bananas which produce splendid bunches of fruit. The oldest orange-trees were planted only eight years ago, and are of phenomenal height and spread of branches. From trees eight years old, twenty-four cases per tree were gathered this season. Ten trees yielded 220 cases, the average being twenty-two cases all round. A case of oranges weighs 50 lb., and contains, according to size, from six to twelve dozen oranges. We saw trees only two years old in blossom, but, of course, these are not allowed to bear fruit. In the third year they carry about one case, and in the fourth they are considered fit to carry a full crop. There is not a sign of disease on any of the trees. All are equally healthy, and each bears an almost equal quantity of fruit when the trees are of the same age. This year the crop was so heavy that scores of props had to be used to support the loaded branches, whilst the older trees were so laden that the very foliage was hidden by the golden fruit. Pineapples and passion fruit thrive equally well on the farm. Once the trees are established, there is little to do except to keep the ground clean, which is easily done on this friable soil, and to prune the trees. The orchardists have thus ample time for other work, such as planting and picking strawberries and Cape gooseberries, which latter grow wild in great profusion all over the cleared lands on the Range. They are sent in quarter-cases to Brisbane and Sydney, where they realise paying prices at the beginning of the season. We heard of one fruit-grower who had 15 tons of this fruit on his farm, and, judging by the vast quantities of gooseberries we saw lying in bushels under the bushes, we are quite willing to believe the statement.

Finding that he had sufficient orange-trees to provide him with a very handsome income, Mr. Smith wisely decided not to undertake the clearing of more land. He accordingly sold the balance in farms of from 12 to 15 acres. All the purchasers were *bonâ fide* fruit-growers, and they have, with the exception of the two latest comers, entirely cleared and planted a large portion of the land with orange-trees. These farms are owned by Messrs. Jorgensen, Andersen, Krog, Sullivan, and Wilson. When their trees are three years older, there will be no prettier sight anywhere to be seen.

MR. T. D. SMITH (Plate XXXI.),

a son of Mr. David Smith, has a very fine orchard adjoining his father's. When he first commenced to plant after clearing, he put in bananas, but although they grew and bore splendidly, still they did not pay, owing to the want of communication with Nambour by decent roads. So, after a time, he rooted them out, and planted orange-trees. Of these he has 1,000 planted, ranging in age from eight years to two years. They, like those of his neighbours, are well grown, healthy, and produce enormous quantities of fruit. In fact, what we have written about Mr. Smith, senior's, orchard applies equally well all round. On this latter farm is situated the well above mentioned. There is a never-failing supply of good water in it. Here also the trees are properly pruned and sprayed by means of a very effective home-made machine, worked by compressed air, and the ground kept clean. In the opinion of Southern orchardists who have visited the Range, this is one of the finest orchards in Australia. The same may be said of the property of another son of Mr. D. Smith (Mr. W. J. Smith), of

SEAVIEW ORCHARD (Plate XXXII.)

This property comprises 160 acres, on which there are over 1,000 trees, 75C of which are citrus fruits, and of the latter 500 trees are bearing. There are some especially fine Washington navel orange-trees, five years old. They bore a very heavy crop this season. Mr. Smith reckons that, whilst some trees yield enormously, taking all the five-year-old trees on an average, the return is eight cases per tree, and three-year-old trees yield one case. Large quantities of strawberries are grown on this orchard, and these sell freely at good prices in Brisbane, Sydney, and Melbourne. The orchard is well named, for, from the veranda of the house, a splendid view of the ocean is obtained, extending from Stradbroke Island on the one hand to Bribie on the other, with a grand bird's-eye view of the Maroochy Heads and the windings of the river, together with all the intermediate country on which numbers of clearings may be seen.

Adjoining Seaview Orchard is another property, also under fruit trees, owned by Mr. Williams, a son-in-law of Mr. D. Smith's.

LUTONVALE (Plate XXXIII.)

is a splendidly situated orchard, lying between the above-mentioned orchards. The area of the whole estate was originally 160 acres, but the owner, Mr. Biggs, sold a portion of it to Mr. Krog. As the land was already quite cleared and planted with orange-trees and strawberries, the latter was enabled to obtain immediate returns, and his new house was nearing completion at the time of our visit. Strawberry-picking was in full swing here, as indeed was the case on almost every orchard we visited. Our illustrations show the young people engaged on this rather tedious work.

Mr. Biggs has retained 250 orange-trees. From fifty-six of these he gathered this season 400 cases, or nearly £2 worth from each tree. There is a large number of young orange-trees which will bear a crop in about three years. The oldest trees are growing on grass land, and appear to thrive equally as well as those on land which is kept clear of grass. I measured three trees, and found them to be from 18 to 22 feet in height, with a spread of about 20 feet. The view from this orchard is splendid, taking in as it does a long stretch of ocean and the whole vista of range towards Obi Obi Creek, and also affords a fine view of the Buderim Mountain with its cleared farms and orchards. I was surprised to hear that Mr. Biggs contemplates selling this property after making such a beautiful home of it. But he prefers dairying to fruit-growing, and intends to establish a big dairy farm elsewhere. He has had more than his share of difficulty and troubles in the early days of twelve years ago. He had to carry everything required for domestic use and for the farm on his back from Nambour, even the portable parts of the furniture. On one occasion he carried, besides rations, a load of six chairs; and when it is considered that the whole distance of 9 miles is up terribly steep and rough hills, this was no small feat. Noticing a dog chained up which was barking most vociferously, I asked why he was tied up, and was told that it was because he was too fond of strawberries. If he were let loose, he would at once make for the strawberry beds and devour quantities of the ripest. Cats also become great strawberry-eaters, and this probably accounts for the few cats, dogs, and fowls which are seen in the district. On the opposite side of the road is a property lately purchased by a New South Wales gentleman, Mr. Secombe (*see* Plate XXXIII.) He owns over 600 acres, the whole of which he proposes to fell and burn off and lay down in *Paspalum* grass. He has already 150 acres felled, and two pairs of sawyers are hard at work cutting beech, cedar, and hardwood to be used in building the house on a fine piece of rising ground about the centre of the estate. Mr. Secombe told me he was trying the experiment of impregnating the large timber and stumps with saltpetre. He showed me one large hole where a stump had been successfully burnt out after being treated with saltpetre. Several of the settlers are doing the same thing, and one man told me that he had bored holes in a tree, filled them with saltpetre, and in three months set fire to it. The experiment was quite successful, for the tree, an otherwise bad burning one, smouldered away from the roots to the ends of the branches. Experiments are also being made with a solution of saltpetre and kerosene. It seems a terrible waste to destroy all this magnificent gum and tallow wood, but it cannot be avoided; the land is required for cultivation,

Plate XXXIII.

VIEWS AT MAPLETON.

Flooded-gum Stump.

Luton Vale Orchard.

Sawyers at Work.

Road from Mapleton to Nambour.

Plate XXXIV.

Taking Strawberries to Nambour. Strawberry-picking. Mr. Johnson's Orchard.

and the timber cannot be sent down the Range to the railway, nor would it pay to cut it into boards on the land. Thus millions of feet of the finest timbers in Queensland are being annually lost to posterity. We measured the stump of one huge tree, and found it to be nearly 60 feet in circumference. The inside had been burnt out and a doorway made into it. On entering we found that twenty men could have found room inside it. Our artist took a picture of the stump with our party looking out of the various openings made by the fire. The butts of these very high trees are so large that in felling them stages are erected and the tree is cut off at from 10 to 15 feet from the ground, as shown in the accompanying illustration.

Passing Mr. Secombe's property, we arrive at what is known as the "Front." This is the township of Mapleton. The first orchard here is

Mr. Rosser's Strawberry Plantation (Plate XXXIV.),

adjoining which is his well-kept orchard, containing 700 healthy looking trees. Here also young people and old were busily engaged in picking and packing strawberries. A constant watch is kept upon the birds, especially upon a kind of shrike, which has somewhat the appearance of a magpie, and commits serious depredations on the strawberry beds. Mrs. Rosser, who attends to the post office and telephonic business with Nambour, has a most beautiful flower garden stocked with various kinds of sweet-scented flowers, amongst which not the least beautiful are double white stocks. On the opposite side of the road is

Mr. D. H. Johnson's Orchard (Plate XXXIV.)

This is a really magnificent property, and is distant only three-quarters of a mile from the tram terminus at the Maroochy bridge. There are 150 orange-trees in bearing, and the strawberry beds contain 20,000 plants. Mr. Johnson has had all the troubles which affected the other early settlers at Mapleton, and in addition suffered a very severe loss in strawberries owing to the sudden illness of his whole family. Three seasons ago his strawberry crop was valued at £400. After picking about £40 worth he was seized with influenza, and one after another his wife and children were attacked in like manner, the result being that almost the whole of this splendid crop was lost. This year the crop is good, but not to be compared with the former, when the whole of the beds presented almost a solid mass of the luscious red fruit. The view from Mr. Johnson's house may fairly be called the finest on the Range, embracing as it does all the land and sea scape as seen from Mr. W. J. Smith's house.

Close by is a similar orchard, the owner of which is a married son of Mr. Johnson. Like the other orchardists, he grows a large quantity of strawberries. Many of the growers take the fruit down the Range on horseback, to avoid the shaking given if transported by wagon. We met a young son of Mr. Johnson riding down the Range on a not too quiet horse. Piled in fruit of him on the pommel of the saddle were six or eight strawberry cases, over which his head and hands only were visible. The cases are not lashed to the saddle, but have to be carried loose, which necessitates the rider holding on to them. Such a mode of travelling is most wearisome, as once the rider is in the saddle behind his load he cannot dismount until he reaches the Nambour Railway Station in about two hours. Here also is the Provisional School, which is well managed by the teacher, Miss Burstall. The attendance of the pupils, who number about 45, is very good indeed, notwithstanding the absences necessitated by the exigencies of strawberry-picking. Our illustration shows 36 of the pupils, the committee, and teacher (*see* Plate XXXIV.)

Mr. Williams, a son-in-law of Mr. D. Smith, also has an orchard close by, and several others are scattered throughout the neighbourhood. To describe all these would be impossible within the limits of the *Journal*, and, as all are working on the same lines, we should be merely repeating ourselves. Starting from Mr. D. Smith's property towards Nambour, we successively pass the orchards of Messrs. Madson, Wilson, Andersen, Sullivan, Jorgensen, Krog, T. D. Smith, Rosser, D. J. Williams, Johnson, senr., and Johnson, junr., Biggs, Krog (brother of the former), W. J. Smith, and further on towards Nambour Messrs. Pope, Phillips, and Whitecross. On the Dulong and Kureelpa road are Messrs. Doig, Dalziel, and a score of others mentioned in our last report on the district in January. Then there are a large number of fruit-growers at the Razorback, now called Montville. Here are the nurseries whence the orchardists obtain their supplies of grafted trees, and which are well known to be all true to name. It is here that Mr. W. H. Harvey grows the fine new strawberry, the "Annetta," which attracted so much attention at the last Exhibition at Bowen Park. We have received a cordial invitation from the Montville Fruit-growers' Association to visit this thriving settlement, and hope ere long to be able to avail ourselves thereof.

Then there is the valley of the Obi, where the settlers are almost exclusively engaged in dairying, for which the grass country, rich soil for fodder crops, and plentiful supplies of permanent water make the district well adapted to the business. The permanence of the water is evidenced by the fact that rock cod 18 lb. in weight are frequently caught in the Obi Creek. From the top of the Range may be seen the homesteads of Messrs. Cook, Hornibrook, O'Gorman, Creighton, Yates, Liekefett, Thompson, O'Connor, and several others as far as Kenilworth Station. Mr. Liekefett has the contract for the mail service, and runs a three-horse coach thrice a week from the Obi to Nambour and back in one day. This coach is a great boon to the settlers, as they get all their small supplies delivered at their door, thus saving many a journey down the Range (*see* Plate XXVIII.) At Mapleton alone, there are at present over 6,000 orange-trees and 60,000 to 80,000 strawberry plants. It would be quite impossible to do justice to this portion of Queensland, so far as description goes, without spending at least a couple of months in the Blackall. The distances are great, the roads bad, and there is so much to see, to admire, and to talk about that it seems almost presumptuous to attempt to describe the position of agriculture and fruit-growing there after a mere flying visit of eight days, including the journey from Brisbane and back.

Before concluding this slight account of the fruit industry of this portion of the Blackall Range, we must make note of the beautiful scenery of the district. Whether travelling along the winding tramline or along the creek banks in the scrub, everywhere is to be seen a great variety of orchids now covered with their beautiful blossoms, the smaller creeping ones covering the trunks of trees with white and yellow efflorescence. The timber itself and the deep gorges, at the bottom of which run clear streams, are awe-inspiring. The Baroon Falls, near Mr. D. Smith's residence, make a clear leap of 700 feet over a smooth, perpendicular precipice. For those who are fond of Alpine climbing, a descent by a very precipitous track presents no very formidable difficulties, even ladies often going down to the gorge at the foot of the precipice. The view from below is magnificent, and hence the falls are a favourite picnic resort during holidays, when numbers of people go there from Nambour, Yandina, Gympie, and Brisbane to spend a pleasant holiday (Plate XXXV.) In the gullies there are beautiful fern-trees 20 feet high, with magnificent umbrageous fronds drooping umbrella-like from their summits.

Our grateful thanks are due to the secretary and members of the Mapleton Fruit-growers' Association for the assistance afforded us to enable us to visit the various orchards in the district, and we also have to thank all those who so willingly placed their horses, vehicles, and themselves at our service for this and the unbounded hospitality with which they received us. It was with genuine regret that we said farewell to our Mapleton friends and returned to Nambour *en route* for Brisbane.

PETRIE'S CREEK.

Whilst in the district we took occasion to revisit Petrie's Creek, having made arrangements with Mr. R. Nichol to meet us with his boat at the end of

Plate XXXV.

BAROON FALLS, MAPLETON, BLACKALL RANGE.

Plate XXXVI.

Planting Cane, Petrie's Creek.

Main Drain, Petrie's Creek.

the tramline. Owing to a block of loaded cane trucks on this part of the line at the mill, we started an hour later than we should have done, and on arrival at the creek found that the tram trollies stopped half a mile from our destination. This distance we had to walk, and consequently a still longer delay took place, so that on our arrival at the bridge on Mr. Higginson's farm we found that the boat had arrived and gone. The tide had been running down, and any delay would have prevented the boat's return down stream. Thus it came about that we found ourselves apparently stranded 4 miles from our destination with heavy, hilly roads before us and with six hours to wait for the return journey by tram.

On our previous trip we had passed along the left bank of the creek. This time we trollied down the right bank. All the way from the mill the line passes through pretty homesteads, at every one of which might be seen groves of orange-trees, mangoes, and sugar-cane. All along the route men were busy cutting and carrying cane to the tramline. The crop appeared to be very satisfactory, and there was no sign of frosted cane such as we saw close to Nambour. Some of the farms are completely under-drained either with drain pipes or with slabs. Mr. Perrin's farm is so drained, as also Mr. Simmons's, and they are quite satisfied that the expenditure on the work—some £12 per acre—has been amply justified. There is still a large quantity of cane to be cut here, and, if the tram were completed as far as the Messrs. Nichol's farms and onwards to the deep water on the Maroochy River, there would be such a quantity of cane planted both here and on the river farms that a second mill would have to be erected, as the Moreton Central Mill would not be able to take more than half of it.

We noticed marked improvements in the district since our last visit ten months ago. Mr. C. Nichol, for instance, has felled some 70 acres of scrub between the Bli Bli road and his original clearing, and is busy planting it with cane. The ti-tree swamp we mentioned as being in process of being cleared and stumped now carries a magnificent crop of cane, all of which is being utilised for plants for the new clearing (Plate XXXVI.) The splendid season has militated against high prices for market-garden truck. A fine field of cabbages and cauliflowers, swede turnips, &c., has to be left to go to seed or be ploughed out, as it will not pay to cart them to the town and send them by rail to Brisbane. Almost the whole of the fine level farms on the creek is being planted with cane. The long drain (70 chains) which draws the water from the swamp has been widened to 16 feet at the top, and performs its duty so well that horses can be worked on this land a day or two after the heaviest rains (Plate XXXVI.)

It should have been stated that when we found ourselves stranded at the bridge we interviewed a farmer who was busy under-draining his land. He was the owner of a buggy and a strong horse, and willingly covenanted to drive us to our destination and bring us back to the bridge in time to meet the trolly. Meanwhile, he invited us to refresh the inner man before starting. His house is prettily situated on an eminence overlooking the creek. The hill has been well stumped and deeply ploughed, and he is about to plant it with citrus fruit trees and pineapples. When these are well grown and the lower farm placed, as is intended, entirely under sugar-cane, there will be no prettier place on the creek. The farm is well watered, and the soil very rich. If the creek, which is now salt owing to the tidal water, were dammed some distance from its junction with the Maroochy River, several miles of fresh water would be retained, to the obvious advantage of the farmers, who would then have the means of irrigating their crops in a dry season.

Agriculture.

AMOUNT OF WATER FOR IRRIGATION.

One of our anonymous correspondents writes to know how much water must be applied per acre to irrigate crops. He does not specify the crop; we must, therefore, answer at some length. Wherever we have seen irrigation practised in this State unaided by scientific teaching, we have observed that the farmers invariably apply water in too great quantities, especially where unlimited supplies of water are available. As an instance, we lately saw a field of maize just in cob flooded to a depth of about 3 inches all over the land. On asking the farmer what the object of this was, he said he had no object. There was lots of water, and, if it did no good, it did no harm. That is where he made the mistake. The first lesson to be learned is that all plants do not require the same amount of water. Some want a great deal, others can do with very little, and there are even many plants which adapt themselves to circumstances. If there is water, good; they will take it up and thrive. If there be none, they thrive all the same. Rye is one of these latter. Of all cereal crops it demands the least quantity of water, and is pretty well able to take care of itself. For barley, on the other hand, irrigation is essential. There is a peculiarity about barley, and that is that it will not indicate to the eye when it is in need of water until it has suffered beyond redemption. Wheat requires three or four applications—the first, if the soil has been in good moist condition to promote germination of the seed, after the plants are 6 inches high; the last just when the grain is heading. But over-watering at this stage may cause rust. Therefore, if the ground is moist, it is better not to give this last irrigation. Maize, if the ground has been deeply ploughed and well worked, can do with two waterings during its growth, but irrigation should never be practised to make the seed germinate, for much of the seed will rot, and those which survive will give feeble plants which the best of after cultivation will fail to improve. Corn is more likely to be injured by excessive watering than any other cereal. It is better not to irrigate it at all than to flood the land as our above-mentioned friend did. Once the grain is glazed, there is no further need of water. Kafir corn, imphee, sorghum, &c., should be sown on soil well irrigated and harrowed down to a fine tilth. When the plants are 18 inches high, the ground should get a good soaking. In four months the crop may be cut. Then the rows should get a heavy watering, which will, with thorough cultivation, cause the stools to send up a heavy growth of suckers.

Broom corn, on the other hand, does not require much water, if the cultivation is good. But at the time of heading then a plentiful supply is required, which will force a good growth of brush, and produce a smooth, long, and straight fibre. The other millets require similar treatment. Flax is another of those crops which demand little water. Still, whilst it is growing, it may be slightly irrigated every three weeks. When the plants are nearly full-grown, irrigation must be stopped to enable the fibre to ripen. Most Queenslanders who have grown cotton are aware that it is one of the most drought-resisting plants. Therefore, it does not demand any great amount of water. The best way to deal with cotton is to plough deeply, irrigate the land, then draw the drills, sow the seed 1 inch deep, and irrigate no more till the plants begin to boll.

Lucerne, unless during a very dry season, only requires a good soaking as soon as a crop is cut. The stubble will then send out plenty of rapidly-growing shoots.

Sugar-cane requires a considerable amount of water, but that amount, as in all other cases, varies as the soil varies. The same quantity of water cannot be applied to crops on heavy land as to those growing on lighter soils. A deep sandy loam will absorb a larger quantity of water than a deep black soil. In the case of lucerne, each plant will consume one-fifth of an inch of water daily. That amounts to 5,000 gallons per acre per day. One inch of water on an acre is equal to about 26,000 gallons. Say the land is deeply ploughed, and it is required to run the water over the surface of a field, at least 6 inches must be run on to wet the top soil, because the water will not run till the top soil is thoroughly saturated. If the soil has been well worked to a fine, deep tilth, the water will at once penetrate as deep as the soil is loose. Water being thus run on for a couple of hours, it will be settling all the time in the subsoil to a depth of, say, 2 feet. This soil will require another 6 inches of water, so that it will require 1 foot of water to wet the land to a depth of 3 feet. But, as all this soil is super-saturated, the moisture will in a few days descend to 4 feet.

Now, if it be allowed that ample irrigation has been provided when 2 inches of water are supplied every ten days as a minimum and 4 inches as a maximum, then there must be, to irrigate 1 acre, a continuous flow of water at the rate of 3.77 gallons per minute for 2 inches or 7.54 gallons per minute for 4 inches. To irrigate 10 acres, the flow would require to be ten times as rapid—that is, 5.04 cubic feet per minute for the minimum of 2 inches, and 10.08 cubic feet for the maximum of 4 inches.

It must be borne in mind that it is not possible to lay down a hard and fast rule for the guidance of those who wish to irrigate any particular crop. There are so many things to be taken into consideration that advice given to a farmer on one class of land in a certain district would not suit the conditions of another man growing the same kind of crop in a different district, on a different soil, under different climatic conditions. Experiments have, however, been made to determine exactly how much water is needed in order to keep the soil in proper condition for plants of different character. Professor F. H. King made the most important investigations, and from them he found, by direct measurement, that from 300 to 500 lb. of water are required for each pound of dry matter produced; in other words, for each ton of hay raised on an acre, 300 to 500 tons of water must be furnished, either by rainfall or by artificial means. Now, as 1 inch in depth of water over an acre weighs 113 tons, it follows that the water required to produce 1 ton of hay must be supplied to a depth approximately of from 3 to 5 inches. Sometimes far more is required. For instance, the actual amount used in producing 5 tons of barley hay to the acre has been about 20 inches in depth.

LIGHT RAILWAYS FOR AGRICULTURAL DISTRICTS.

The successful construction of a tram-line on a 2-feet gauge, in that most difficult and precipitous portion of the Blackall Range between Nambour and Dulong, will, no doubt, bring to people's remembrance similar lines in other parts of the world. As shown in the picture of some of the curves on the Nambour-Dulong line, it will be seen that in the spot illustrated a three-quarter circle occurs, and if three trains were there each would be about 20 feet above the other. The same thing occurs on the Duffield Branch Railway, in England, a light "baby" line owned by Sir Percival Heywood, Bart., and described and illustrated in *Harmsworth's Magazine*, Vol. II., No. 8. This line, we learn from the article on the subject in that periodical, is only 1 mile in length, but it is a perfect railway in miniature. It runs through his estate, and cost about £900, exclusive of rolling-stock. The gauge is only 15 inches. There are three tunnels, two bridges, and a viaduct 90 feet long and 20 feet in height. The line is perfectly equipped with interlocking signals and points worked from two signal-boxes in telephonic communication. The miniature goods wagons are 5 feet by 2 feet 6 inches inside, and were constructed to carry a maximum load of 30 cwt. Besides goods trucks and brake vans, there are dining and sleeping cars and a 15-feet luggage wagon in use upon the tiny railway. When the line is used on the occasion of a garden party, a regular service of passenger trains is run, consisting of 8 long bogies and capable of carrying 120 passengers. On the line there is a wonderful three-quarter circle curve of 40 feet radius.

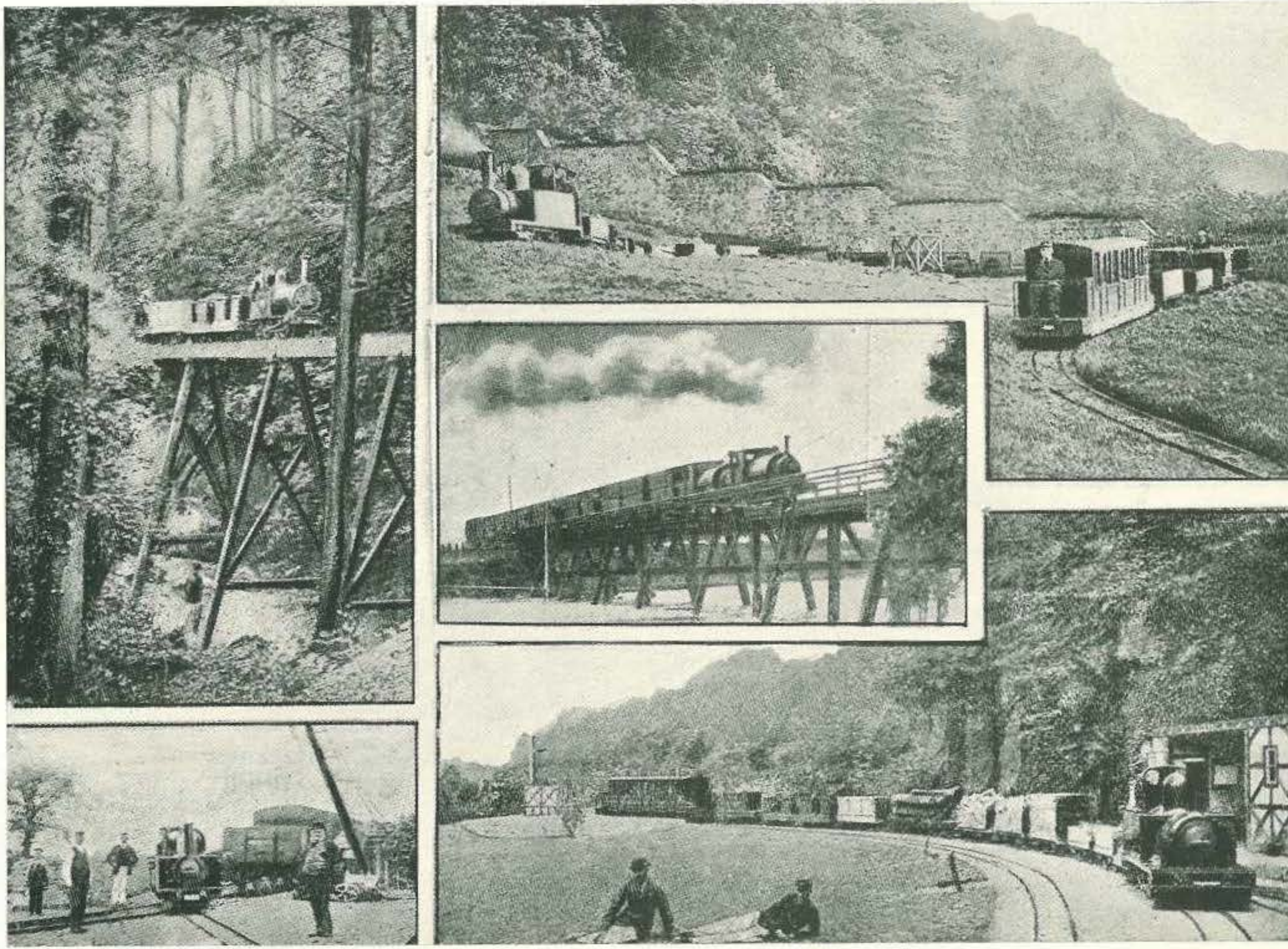
Another narrow-gauge line on a more ambitious scale is the Eaton Railway, the property of the Duke of Westminster, designed and constructed by Sir Percival Heywood. The gauge is 15 inches. It is 3 miles long, and cost about £5,893 to construct. It is used almost solely for goods traffic, but there is one passenger car, an eight-wheel carriage, capable of accommodating sixteen persons. In one year it carried 5,986 tons, and ran 4,892 miles. The locomotive weighs 3 tons, and carries oil and fuel for an hour's running. The total cost of maintenance, wages, coal, &c., comes out at about £626 per annum. Thus the cost of working the line may be estimated at a little over £12 per week. There are two miniature railways, illustrated in the magazine, which are in use by the public. One is the Southwold Railway, 9 miles long. It owns three locomotives, six passenger vehicles, and twenty goods wagons. The other is the Corris Railway, 11 miles in length, with about the same rolling-stock as the former. The gauge is 2 feet 3 inches. The smallest railway mentioned in this article is a mere toy, built by the Rev. W. Preston, in Ireland. The speed of the trains on this line is 6 miles per hour, and a coach carries sixteen passengers.

Great expectations were entertained in the old country that the light railway was going to solve the whole problem of agricultural depression, but Sir Percival Heywood does not share this optimistic belief, although he is fully alive to the value of the system in certain districts. In his book on "Minimum Gauge Railways," there occurs a reprint of a clever parody entitled "That Tight Little, Light Little Railway," which appeared in a London evening paper at the time of the passing of the Light Railway Act. One of the verses is quoted in *Harmsworth's* as follows:—

You farmers who lately
Have suffered so greatly
From agricultural depression,
Shake off gloom and sorrow,
A brighter to-morrow
Will dawn in the cour-e of the session.
By no relaxation
Of rates or taxation,
By a certain sure-never-to-fail way,
Through Government pleasure
To bring in a measure
For giving some districts a railway.

A light little, tight little railway,
A nice little, light little railway.
Oh! Think of the joy
Of that exquisite toy
A tight little, light little railway.

The above extracts lead us to consider the subject of light railways, usually called tramways, in Queensland. The narrowest gauge line in mountainous country which has as yet been built in this State is that known as the Nambour-Dulong and Mapleton line. For some distance to the foot of a portion of the Range, the land is level. Then begins an ascent such as could not be achieved by a regular railway under probably £5,000 or £6,000 per mile. Heavy cuttings, tunnels, and strong bridges would be of frequent occurrence, and maintenance would also be a heavy item, if we may judge of the cost of maintaining the Cairns-Atherton Railway on the range portion, at least, of the line. The Dulong line passes over country very similar to that over the Range to Kuranda. There are deep gorges, high precipices, dense scrubs, gullies, and water courses to be negotiated. The total length of the line up the Range (800 feet) is 86 chains. There are no reverses or zig-zags or tunnels, and the



MINIATURE RAILWAYS.

sharpest curve is a horse-shoe curve of $1\frac{1}{2}$ chains radius, the steepest gradient is 1 in 25, the rest being from 1 in 40 to 1 in 50 on the Range and on the descent above it to the Maroochy River. Six bridges and ten culverts, all of an inexpensive kind, have been constructed on the whole line. The cuttings, with one exception below the Range, are all small, and nearly all are sidlings, only one side being cut down to form the permanent way round the hills. The total cost of this line has been under £900 per mile. The motive power for the carriages is a motor driven by an oil-engine, this being considered more suitable than a locomotive and infinitely less expensive to work, both as regards labour and fuel.

Now, what does this narrow-gauge, inexpensive line do for the district?

In the first place, it carries some thousands of tons of sugar-cane from all the level country around, and to the canefields of which portable lines are laid down as feeders to the main line. It has been the means of numbers of settlers buying land at Dulong, Mapleton, and elsewhere, most of which is already under sugar-cane, which will be ready for the mill next season. Timber, fruit from the orange orchards, strawberry gardens, and banana groves of the tableland will have quick and certain dispatch to the main Gladstone to Brisbane Railway. Passengers can be conveyed easily and swiftly to their homes 9 miles away above the Range at any hour of the day or night, a matter of sheer impossibility in wet weather, so long as horses have to be used on the precipitous and boggy so-called high roads. Thus the public is benefited. And how about the State? The latter must always be advantaged by whatever induces settlement on the land. Wherever close settlement is the result of the construction of a railway of wide or narrow gauge, there the State must derive revenue from various sources. Even if the rail or tram way does not pay a direct percentage on its cost, still the State is the gainer by the settlement of the land through which it runs, and by the establishment of industries of various kinds in a district which, but for the means of road communication provided, would have still remained in its primeval state. This is well proven in the case of the Beaudesert, Blackall Range, the Mourilyan, the Burdekin district, the Herbert, and others in which tramways have been built.

DEEP CULTIVATION FROM THE SMALL FARMER'S POINT OF VIEW.

Our readers will remember that in a recent article in the *Journal* on "Irrigation at Bundaberg," we described the operations, in that direction, of Mr. Mikkelsen, of Fairview Farm, Avondale. Since our visit to that gentleman's farm, he prepared and read the following paper on deep cultivation at a public meeting, presided over by Mr. D. Hull, president of the Avondale Farmers' and Planters' Association. Mr. Mikkelsen, who is a practical farmer, and also a very clever mechanic, prefaced his remarks by stating that he was not posing as an agricultural expert, having drifted away from his trade to become a tiller of the soil only in recent years, and, continuing, said:—

But this, notwithstanding, I am quite sure, getlemen, that I can hold a plough with any man, and if put to the scratch, well, I think I could make you a good serviceable plough also. Gentlemen, these are my qualifications for addressing you this afternoon. My paper has been prepared in the interests of the small struggling farmer who, in my opinion, is entitled to all the support, sympathy, and information it is possible to afford him. But when I say this, it must not be thought for a moment that I am reflecting in the slightest degree upon our well-to-do agriculturists. They have better opportunities of acquiring information of value to them than have we small men—though, possibly, they may even find something in this short paper by which they can gain some profit.

Farming to-day is not what it was in olden times, for like everything else in this go-ahead world, it has become, and is becoming more so daily, a science, and as such it must be considered by all who would make the most of their opportunities as tillers of the soil. Recently Dr. Maxwell addressed the farmers in our district, and when he pointed out the wealth we have stored in our soil within a foot or so of the surface, it set me wondering that I had been able to raise a crop at all while following the methods I had up to that time adopted. I can assure you that up to that time I had not ploughed deeper than an average of 6 inches or 7 inches, but being possessed of a good piece of ground its quality, no doubt, served to make up for my imperfections in husbandry while the seasons were good, but when the drought came my faulty methods told their tale very plainly and very severely. One of the reasons why this was so having been made clear to me by Dr. Maxwell's address, I have recently bombarded the treasure he pointed out, and I am sure had the Doctor told me that I had a gold mine within a foot of the surface I could not have rooted up the soil with more determination, and I am pleased to say that I have got down a good deal deeper than I expected would be within my means to accomplish with the horse-power at my disposal. And the results have been such that after this there will be no surface scratching for me when preparing my land for a crop; further, I see no reason whatever why every farmer working under similar conditions cannot do what I have done so far as deep cultivation is concerned.

Gentlemen, there is an abundance of wealth in the farm if we only know how and are determined to shovel it out; but always be guided by this piece of sound advice, do not attempt to cultivate more land than you can attend to thoroughly. Excuse me for saying here that a good many farmers are troubled with a peculiar disease, and that disease is known as earth hunger; an abnormal craving for large estates. How many are there of us who are in the habit of biting off more than they can chew? That is not a very polite expression perhaps, but I am sure you will admit that there is some truth in it. You are all aware that John Chinaman contents himself on a 2-acre farm and makes a good living, but look at John's farm, and observe the tillage, and you know that John always looks out for a drop of water, even if he has to carry it half a mile, he gets it all the same. I do not mean to be understood to say that we should all grow vegetables and nothing else, but if we grow sugar-cane we should grow it on much the same lines as John grows his cabbages—that is, we should cultivate thoroughly; and if we are able to apply water—well, then so much the better. I will now endeavour to give some encouragement to the would-be farmer, and trust my advice in that connection may be of some utility. Now, gentlemen, to make a successful farmer it is necessary to have a good sound body, a clear head, and a good piece of ground to farm on before a start can be made. To me it seems a deplorable state of things to see so many of our young men begging for something to eat when they might be self-sustaining on a piece of land, and instead of seeking work for themselves be in a position, probably, to employ a hand or two. If you ask them why they don't go on the land, they will, as a rule, tell you that all the good land is taken up. While there is some truth in such a statement, it is a well-known fact that good land can be obtained on most satisfactory terms, with the right of purchase, almost anywhere near the railway line and markets, and were I to start afresh I am sure it would pay me better to give up to £1 per acre yearly rent than to go out to the back blocks at 6d. per acre per year. Every farmer in selecting his farm, either from the State or from private owners, should regard the proximity of markets as one of the necessary factors of success. The chief trouble with our young men is this: Some have too little heart, and others too much conceit. To the former let me say this, that perseverance can overcome many obstacles, and to the latter I would say, if any man thinks he has got too much brains to farm with he will find that he is deceiving himself, as I can assure him that on the farm he will need all the ability he possesses, and sometimes a little more. Some of our noblest of men have spent their lives as farmers, and I can assure you that, personally, I am very proud of being a farmer. Further, I firmly believe that the father who trains his boys to be good farmers settles something very substantial on them for life. I will now conclude the first part of my paper by quoting the following lines written in honour of the calling we follow:—

Give fools their gold and knaves their power,
Let fortune's bubbles rise and fall,
Who sows a field, or trains a flower,
Or plants a tree, is more than all.

For he who blesses most is blest,
And God and man shall own his worth
Who toils to leave as his bequest
An added beauty to the earth.

If the toiling farmer needs more encouragement, let him read the never-to-be-forgotten words of Longfellow in his magnificent "Psalm of Life":—

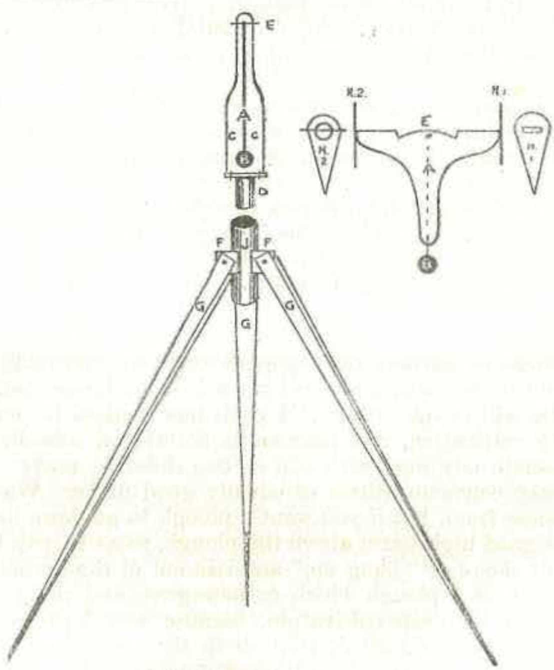
Lives of great men all remind us
We can make our lives sublime,
And departing leave behind us
Footprints in the sands of time.

Let us then be up and doing
With a heart for any fate,
Still achieving, still pursuing,
Learn to labour and to wait.

Deep Cultivation, and How it can be done.

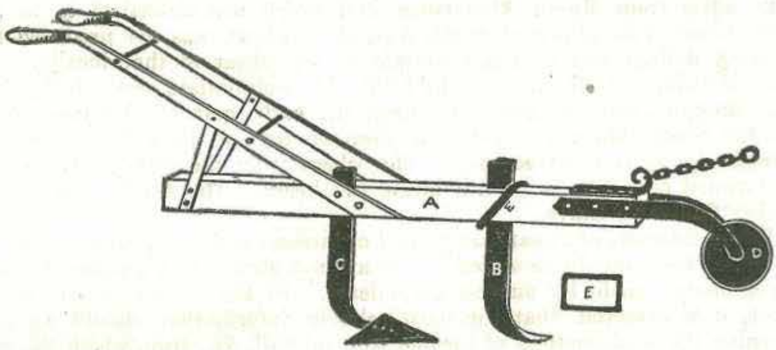
Gentlemen,—You are all aware that in playing a game of euchre it is not necessary to have the Joker, Right and Left Bowers to score a point if you are a good player. But if you are not a good player. you will need all the best cards, otherwise you will lose the game. The same thing holds good in agriculture. If you are a good farmer, you will easily score a point, even if you have not the best of everything at your command, and a good farmer always farms for profit. If on the other hand you have plenty of money to back up your requirements, then get a steam plant, for it will break up your farm far more expeditiously than horses can do. But the outlay is very considerable, and if you wish to hire one it may not always be available at the time you require it. Therefore, as this paper is prepared for the information of the small man, I shall confine myself to horse motive power. Of all the animal kingdom I believe the horse is the best and noblest servant that God has given to man, and as the returns from a small farm are not sufficiently large to warrant any heavy expenditure, the small farmer must earn such expenditure himself, otherwise instead of the farmer fattening on the land someone else will fatten on him. I shall now deal with some of the best ploughs for deep cultivation, and afterwards describe a subsoiler as used by me. Though I shall only deal with one or two different makes of ploughs, I do not in any way condemn others of equally good make. We have enough of ploughs to choose from, but if you want a plough to go down deep, you must select one with a good high beam above the plough, so as to give her clearance, otherwise she will choke or "bung up," and rise out of the ground. Now, it is a well-known fact that a plough which gathers grass and rubbish in the neck is entirely unsuited for deep cultivation, because you lose too much time cleaning her, and with a bundle of rubbish in the neck she pulls very much heavier. The farmer who has only a limited number of horses should also be careful not to get his plough too large. A 10-inch plough is plenty large enough, and will cover about an acre a day. If the furrows are cut wide, it follows that the bottom to be broken up will also be wide, and as the bottom is very much harder than the top the wider the furrow the more power will you require in the subsoiler. There are two swing ploughs I would especially recommend; the Syracuse or Solid Comfort Plough Company are the makers of very serviceable and highly finished little swing ploughs.

The plough I use is of Canadian make, made by the Cockshut Plough Company. The size is a 10-inch cut. With this implement I can, in the Avondale soil, do an average depth of 16 inches with three horses, and with two horses about 12 inches deep. I cut my furrows about 9 inches wide. I have recently cross-ploughed and subsoiled 25 acres, and with five horses I have got down a good average depth of 20 inches. The time taken was five weeks, or at the rate of 5 acres per week. I yoke two horses in the plough and three horses in the subsoiler. I would advise farmers who go in for deep ploughing to make good use of the cold weather in order to save their horses. I have now shown how you may break up your farm to a reasonable depth, and I am sure if you give it an honest trial you will succeed. If, after breaking up and getting the land in good tilth, you wish to plant cane, I would advise you to get the very best plants obtainable. If the manufacturer who buys your cane should happen to have a superior cane for plants than you possess, I have no doubt you would be met half-way in that respect, for the old adage holds good in a matter of that kind, "That what is good for the goose is good for the gander." If you have any draining to do or water races to make for irrigation purposes, you will need a surveyor to take the levels of your land. But here again let me press upon the small farmer not to employ too many experts, for the simple reason that small farms will not run it. The farmer amongst his many other qualifications must, if possible, be his own surveyor. I have designed an instrument that will take all the levels most farmers require, and it is so very simple of construction that it is possible for every farmer to make a levelling instrument for himself, and, as I have not patented it, I shall be very pleased if some of our farmers are enabled to profit by this little instance of my humble mechanical skill.



LEVELLING INSTRUMENT.

Mr. Mikkelsen also said that the subsoiler he had in use at his place was made by himself. He had a model of it on the table, and he could assure them that in point of serviceableness it would compare most satisfactorily with any costly implement they might purchase. Any farmer who could mortice a couple of holes, and he thought all of them could do that, could get a blacksmith to make all the necessary ironwork at a cost of 12s. This would mean a subsoiler at a cost of 12s. as against £5 10s., the price they would ordinarily pay for such an implement. He did not say for a moment that the models he had submitted typified the best in these lines, not at all; if they could afford to purchase the very best implements, by all means do so, but his paper was prepared in the interests of the small man, and he maintained they could



Subsoil Plough.

make a subsoiler that would give them splendid results at a cost not exceeding £1 by following the design he had submitted. That was reducing the cost of farming implements, and, with regard to his levelling instrument, it could be made at a cost of 5s. as against a cost of £30 for a theodolite. He thanked them for their attendance and the patience with which they had listened to his paper. In conclusion, he might say he was prepared at a later date, if they wished it, to read a practical paper on irrigation from a small man's point of view.

At the request of Mr. Nielson, Mr. Mikkelsen explained the method of using the instrument for taking levels in the interests of farmers who desired to carry out a system of drainage.

Description of Levelling Instrument.

A is a piece of plain galvanised iron cut as per sketch and resembling a T square; B is a leaden ball which by gravity keeps H1 and H2 horizontal or level when A is mounted in C and swung on the pin E. H1 and H2 are cut as per sketch; any material will do, such as a jam tin or plain galvanised iron. H1 has a small slot cut in it about $\frac{1}{16}$-inch wide and $\frac{1}{4}$-inch long. H2 has a round hole cut in it $\frac{1}{2}$-inch in diameter. A fine brass wire is soldered across horizontally in the centre of the $\frac{1}{2}$-inch hole. H1 and H2 are then soldered on to A at H1 and H2. Great care should be taken in having the slot and brass wire at right angles to the dotted line where the weight B is suspended. C is a piece of stiff hoop-iron $1\frac{1}{2}$ to 2 inches wide, soldered or riveted on to D. D is a piece of brass tube which fits into another brass tube. E is a small hole drilled in C to take a small pin on which A is balanced. J is a piece of brass tube 5 inches long x 1 inch in diameter. F is one of three lugs soldered on to the tube F1. G is three wooden legs with a saw cut at F and a small bolt through the lugs F. The legs should be fitted so that they will close in or spread out like any other tripod. A staff or a ruled white batten is necessary for taking levels. You take a sight through the slot H1 and brass wire H2. H1 and H2, of course, must be horizontal.

Description of Subsoiler.

A is a piece of good sound timber 4 inches x 4 inches x 5 feet 3 inches long. A mortice is made at B and C to take $\frac{3}{4}$ inch x $2\frac{1}{2}$ inches teeth. B is a grubber tooth chisel pointed, the front edge sharpened like a coulter. C has a steel foot riveted on. D is an ordinary horse hoe wheel. E is a link made of 1-inch or $1\frac{1}{8}$-inch round or square iron. This link is slipped over the beam A before the tooth B is put in. When the tooth B is wedged in, this link prevents the beam from splitting, also protects the mortice when the tooth strikes roots or boulders.

MOUNT ABUNDANCE WHEAT.

We are informed by Mr. A. Brumpton, of Hodgson, that the wheat brought to our office from Mount Abundance, and which was described to us as a sample grown from imported South Australian wheat, was not produced from that seed, neither was it a fair sample of the wheat of that locality. The Mount Abundance land was sown in 1902 with acclimatised seed which, owing to the drought, did not germinate until the early part of this year (1903), when the South Australian seed was sown on top of it, and harrowed in. Consequently, it is a mixed crop. The wheat from the acclimatised seed is very forward (5th October), with large, full heads. The stool we received is probably Sullivan's Early.

In the interests of wheatgrowers and of farmers and fruitgrowers generally, only actual facts should be stated, as we are not always in a position to verify the statements made by our correspondents. In the matter of the present harvest, it is essential that the most reliable information should be given concerning the seed, method of sowing, soil, rainfall, &c., from which the crops have been produced, as it is only by such means that wheatgrowers can arrive at the best results.

CONSERVATION OF QUEENSLAND BUSH GRASSES IN THE FORM OF ENSILAGE.

By J. MAHON, Principal, Queensland Agricultural College.

In writing on this subject I have no intention of recommending our farmers to attempt to conserve, in the form of ensilage, Queensland grasses grown upon uncultivated land unless chaffed and mixed with a greater proportion of a more succulent material such as lucerne, maize, sorghums, amber cane, cowpea, &c. My opinion in this respect has been borne out by practical results at the Agricultural College during the years 1901 and 1903. In 1901 bush grass was, in the early stage of growth, put in the bottom of a silo to a depth of about 3 feet, the silo being then filled with a mixture of chaffed sorghum and maize. The result was that the stuff, which consisted of bush grass, was totally unsuitable for fodder. It was found to have reduced in bulk at least 60 per cent. more than the sorghum and maize, and was partially in the form of a mulch, this being brought about by the fact that the grasses did not contain substances suitable for their conversion into silage. This year the grasses were saved at a more advanced stage of their growth—*i.e.*, when they had reached the seeding stage—the result being failure, as already reported, due to the fact that the grasses, no matter what pressure may be applied, will not pack and solidify like heavy juicy stuff, causing the admission of air, and allowing an undue proportion of moisture to escape. The grasses siloed were the ordinary bush grasses, *Andropogon intermedius* and *A. pertusus*, grown upon sandy ridges, which, when they reach a stage of growth greater than 6 or 8 inches in height, become deficient in moisture, light, and fibrous. The following are the analyses of these grasses, together with the analyses of an ordinary crop of maize which has reached the proper stage for siloing, also analysis of lucerne. These analyses are submitted so that a comparison may be made as regards the composition of stuffs which may without difficulty be siloed.

ANALYSES.

Green Fodder.	Moisture, per cent.	Total Fibre, per cent.
Lucerne	79.30	10.67
Corn	80.40	5.50
Andropogon intermedius (early stage of growth)	63.60	27.25
Paspalum dilatatum	72.84	18.68
Ordinary pasture	57.67	31.13

The above represents analyses made upon green samples.

The following represents the analyses of grass similar to that placed in the College silo. These samples were chiefly composed of *Andropogon intermedius* as naturally existing previous to harvesting. The moisture of these samples was determined, but the fibre has been calculated upon the analysis of the green *Andropogon* given above.

	Moisture, per cent.	Total Fibre, per cent.
No. 1 Sample	43.29	42.45
No. 2 Sample	47.83	39.05

The grasses from cultivated lands are much superior to those grown where no cultivation has taken place, being of a more succulent nature, and possessing a greater feeding value. Such grasses, if cut at an early stage of their growth, and especially if they contain a reasonable proportion of herbage, may be successfully converted into silage; but, even in this case, a considerable amount of pressure is necessary, because the stuff will not pack by its own weight sufficiently to exclude the air, and, consequently, a mouldy and inferior ensilage will be the result. In New South Wales, artificial grasses have been saved in the stack, but more in the form of sweated hay than ensilage. I do not know of any rough bush grasses having been successfully saved either in the stack or in the silo. I know of many stacks of ensilage having been destroyed by fire not only in Queensland but elsewhere. Three have been destroyed in this State during the last six months. We have, however, no record of silage consisting of maize, sorghum, or other heavy juicy stuff having been destroyed by fire. I strongly recommend our farmers to save the bush grasses in the form of hay, this being the best and cheapest means of doing so, at any rate until we have more convincing proofs that Queensland bush grasses can be successfully converted into ensilage. I may further point out that I am in possession of the best literature on silos and silage-making, and have also had a large practical experience in this State and elsewhere, and it is therefore thought that information from such a source should be more reliable than that which is often found in print, which in most cases is the imaginary idea of a faddist, who gathers his so-called information from persons who are as anxious to spread impracticable ideas as the person who is bold enough to commit them to print. It is fortunate for the farmer of this State generally that he is, after all, wise enough to gather his knowledge from reliable sources, and is not to be led away by borrowed ideas which, under different conditions, may or may not be workable. In conclusion, I may say that I shall be thankful if those who have had experience in connection with the conversion of bush grass into ensilage will communicate with me on the matter, so that we may further investigate the whole question. Referring to the destruction of the College silo and silage stacks elsewhere by fire, I consider that the experience has been a good object lesson to the farmers, a lesson which may save them many hundreds of pounds sterling. I take it that an institution such as the Agricultural College, where experiments are carried out, must surely expect to encounter failures from which those interested will profit to as great an extent as from our successful experiments.

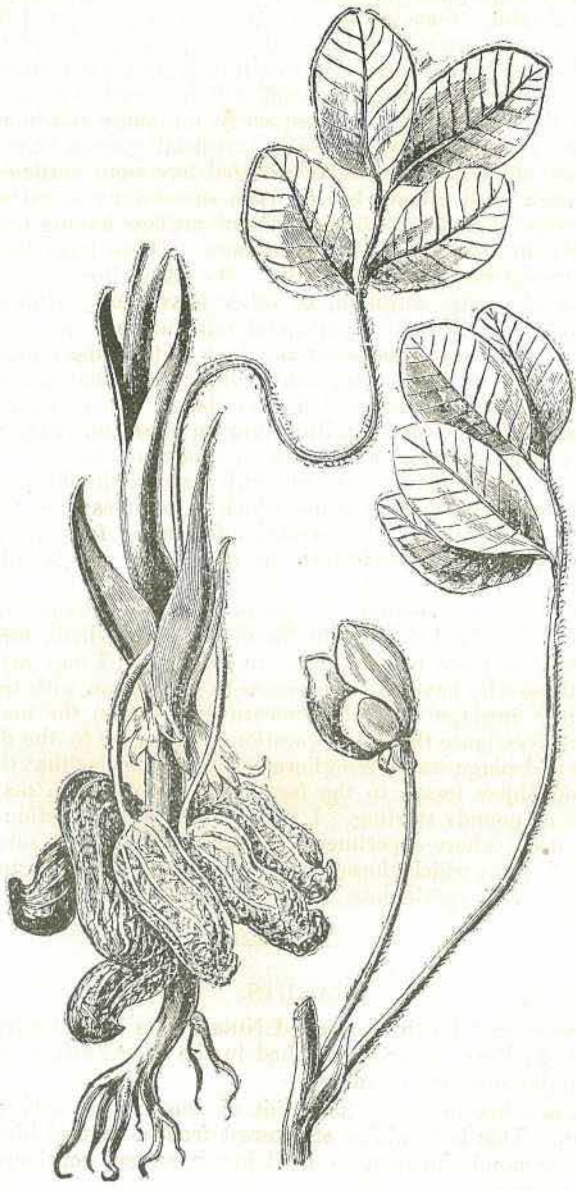
PEANUTS.

From a paper on "Earth or Ground Nuts in the West Indies," by W. G. Freeman, A.R.C.S., B.Sc., F.L.S., published in the *West Indian Bulletin*, Barbados, we make the following extracts:—

The plant is remarkable for its habit of burying its seed pods in the ground to ripen. This fact, whilst of interest from a natural history point of view, is also of economic importance, as it increases very considerably the cost of harvesting the crop.

The general characters of foliage, flower, and fruit are sufficiently well indicated in the accompanying illustration. The plant naturally trails on the surface of the ground. In some varieties the pods are borne along the trailing branches or vines, whilst in others they occur mainly at the base of the main stem. This apparently unimportant difference is also of economic value, as the varieties bearing pods along the vines are more troublesome to harvest than the others.

Ground nuts are cultivated to a limited extent in various parts of the West Indies, mainly for their value as an article of diet, whilst their more important use, as a source of oil for cooking purposes and as a source of oil-cake, is practically ignored. In view of the very large importation of oil, oil-cake, and oil-meal into these colonies, it would seem that more attention might be given



to the cultivation of this plant, not necessarily in the first instance for export purposes, but to satisfy home demands and to help, to some degree, towards that self-support which has so often been urged on West Indian planters as one of their first duties in the present period of depression.

Cultivation.

Soil.—A light, well-tilled soil appears the most suitable for the ground nut, and lime is apparently essential. When the nuts are intended for export, for dessert purposes, they should preferably be grown on a light-coloured soil; dark soils spoil the appearance of the husks, and lower the value of the nuts sometimes by as much as £4 per ton. Ground nuts thrive well on light, rich, volcanic soils in St. Vincent, on poor, friable, calcareous soils on the windward coast of Barbados, and on sandy soils at Carriacou. Good crops have also been obtained on heavy black land both in Barbados and Grenada, but in these cases the cost of harvesting the crop is very heavy.

Preparation of the Soil.—The land is usually well tilled, with hoe and fork, to a depth of about 6 inches. This is best done before the rainy season sets in. A supply of pen (stockyard) manure is often added, either immediately before sowing the ground nuts or during the cultivation of a previous crop. One grower, for instance, in Barbados, practises a rotation of ground nuts and yams; he manures the ground well each time before planting yams, but does not directly manure the nuts.

Planting Season.—A moist condition of the ground being essential for the germination and the successful growth of the young plants, seed is usually sown before the onset of the rainy season. At St. Kitt's the plants meet with most success if planted in May, and in Barbados and Carriacou June is the usual month. On the other hand, Mr. L. C. Thorpe, of Pointe Mulâtre, Dominica, reports good results from American seed sown in September, the crop being reaped in the following March.

Sowing.—The nuts are shelled and seed set from 1 to 3 feet apart and about 3 inches deep. At Carriacou the widest planting is in vogue, and the seeds are sown two together. At other localities they are usually sown singly, and closer together. Some cultivators soak the husks for about two hours before planting, but this practice is not generally adopted. The seeds are covered with soil, lightly pressed down by the foot, and a little loose mould is sometimes raked over the impress of the foot to prevent the sun "caking" the soil and hindering the spring of the young shoots.

Taking the medium spacing mentioned, 18 inches, about 19,000 seeds would be required to the acre.

Care after Planting.—Beyond weeding, little attention is necessary. Fowls should be excluded when the seeds are germinating, as they greedily eat the young shoots.

Time to Mature.—The ordinary variety cultivated in the West Indies takes from four to six months to ripen its fruits. Taking the average time of sowing to be June, the crop is usually ready between November and January. Some of the American varieties ripen in three months.

Harvesting the Crop.—The plants are dug up and the nuts picked off by hand. This method is laborious, because the nuts occur along the trailing branches. The substitution of a variety bearing, as some do, their nuts chiefly at the base of the main stem would probably be advantageous.

Yield per Acre.—In Barbados 2,000 lb. of nuts per acre is looked upon as a fair average crop, whilst yields of 4,000 lb. per acre are not unknown. It is difficult to obtain reliable data under this head, as small areas only are cultivated in the majority of cases, and the ground nuts are grown amongst other crops.

The average yield in the United States appears to be from 1,000 lb. to 2,000 lb. per acre. In Senegal, land cultivated by the natives gave from 600 to 1,800 lb. to the acre, whilst land worked by the plough gave 2,700 to 6,100 lb. to the acre.

Cost of Cultivation.—The following data were kindly furnished to Mr. Lunt, of St. Kitt's, by Mr. W. D. Gordon, of Con Phipps Estate, in that island, who experimented with a few acres:—

	s.	d.	
Close ploughing	5	0	per acre.
Hoe-harrowing (in two directions)	2	0	,,
Planting, by hand	4	0	,,
Weeding and moulding (once)	3	6	,,
Reaping (at 1s. 6d. per barrel) for ten barrels...	15	0	,,
Total £1	9	6	

The yield was ten barrels per acre (weight not stated). The selling price per barrel ranges in St. Kitt's from 7s. to 15s. Taking 11s. as the average, the returns in this experiment were £5 10s. per acre, which, after deducting rent of land, cost of management, &c., would leave a considerable profit, and in addition there is the value of the vines as fodder.

THE USES OF PEANUTS.

In Confectionery.—In the United States of America some 40,000 tons are raised annually; fully three-quarters of the total crop are used in confectionery; the better grades are roasted and eaten, and the inferior kinds made into burnt almonds, &c.

As a Source of Oil.—The ground nut is very rich in oil—from 30 to 50 per cent. of the weight of the shelled nut, according to published analyses. This oil is agreeable to the taste and smell, and very similar in character to olive oil and cotton-seed oil. The best grades of the oil, "cold drawn," are employed for culinary purposes. So good is this oil that it is a common substitute for and very difficult to distinguish from olive oil. The lower grades of oil are used to an enormous extent in soap manufacture and for lubricating purposes. Marseilles imported, in 1900, 104,542 tons of ground nuts, principally for the manufacture of soap and of the pure oil. The bulk of these came from the British and French possessions on the west coast of Africa and a small proportion from India.

As a Source of Oil-cake and Oil-meal.—The refuse left after the expression of the oil forms an oil-cake. Chemical analyses prove it to be extremely rich in carbohydrates and nitrogenous matters, with, in addition, a considerable quantity of fat. It is one of the most concentrated feeding stuffs with which we are familiar, ranking with cotton-seed meal, linseed meal, &c., and in some cases is ahead of them.

Experiments made in 1891-2, at the Woburn Experiment Farm, England, showed the ground nut to be a useful feeding material for cattle and to have a feeding value just about equal to that of beans.

* * * * As a food for cows it is admirable, both in increasing the yield of milk and in improving its quality. * * * * A daily allowance of from 4 to 6 lb. of the cake, given in the form of paste and mixed with 2 or 3 lb. of bran, constitutes a perfect food for milch cows. For sheep, there is no better food than earth-nut cake given dry and broken into small pieces. Many experiments have proved the value of the cake as a food for pigs. For these animals it is generally made into a thin gruel and given mixed with bran.

As a Fodder.—The vines are largely used in some parts of the world for fodder, and under the name of "peanut hay" are highly esteemed in the United States. * * * * The food value of the hay is of course higher, the greater the percentage of nuts left on the vines in harvesting. The hulls also appear to possess considerable value as a feeding stuff, being much richer in valuable food constituents (protein, fat, and carbohydrates) than cotton-hulls, which are extensively used in some localities in the south of the United States as a coarse fodder and about equal to the poorer grades of hay.

AS AN ARTICLE OF EXPORT.

In order to ascertain their value in the British market, the department forwarded in 1902 two small consignments of ground nuts for valuation and report.

The samples sent consisted of nuts selected for size and general appearance.

Messrs. Leete, Son, and Co., of Liverpool, on 21st April, 1902, reported as follows:—"Having examined the sample of ground nuts, we are of opinion that same are very fine in size, and would be saleable in considerable quantities for eating purposes at a value of about £16 10s. to £17 per ton, if the outside shell could be kept clean and bright (*this is important as people buying for dessert purposes require a nice appearance*), also the nuts should be *dry* when shipped, as we find that inside the shell the kernels are inclined to be mouldy in the sample.

"Should it be impossible to obtain the nuts in any better condition than the sample shows, they would only be fit for crushing purposes, and the value would only be from £10 to £11 per ton, but no doubt large quantities could be sold for this purpose.

"This year there is a partial failure in the Senegal ground nut crop, while India (East) has produced a considerably larger crop than usual."

Messrs. James Philip and Co., to whom the second sample was sent, replied:—

"With reference to the ground nuts we shall be happy to try and sell any you may send over, but the brokers say they ought to be cleaner looking: much better specimens come from the States and elsewhere, and they will fetch about £3 to £4 a ton more *without* the shells. At present they are worth about £9 to £12 a ton here, perhaps more, but, like everything else, it is all a question of supply and demand."

In both reports it is to be observed that stress is laid on the importance of the nuts being clean and in good colour.

One method of improving the appearance of the nuts which suggested itself was by bleaching, as is carried out with other kinds of nuts, on a commercial scale, in some parts of the world.

In the experiment made, the method adopted was that described by Professor E. W. Hilgard as having given satisfactory results in California. The nuts were immersed in a solution made up in the proportion of 6 lb. of bleaching powder and 12 lb. of washing soda to 50 gallons of water. After remaining in this bath for five minutes, the nuts were washed under a tap and placed in a second bath containing about 6 oz. of sulphurous acid to 2 gallons of water.

The weak solution of sulphurous acid was employed in place of bi-sulphite of lime, this chemical not being procurable in Barbados. After five minutes in this bath, they were again washed, and then spread out in the sun to dry. The whole bleaching process (exclusive of drying) took about fifteen minutes.

The results were very satisfactory. The nuts so treated had a nice, bright, clean appearance. They were free from any objectionable smell, and their flavour was not injured in any way.

One ready method of ascertaining whether the treatment had had any injurious effect on the nuts was to test the germinating power of bleached and unbleached nuts from the same original sample. This was done. The percentages in the two cases were:—Bleached, 74 per cent.; unbleached, 72 per cent.

The bleaching may safely be regarded as without harmful effect on the nuts.

TRIAL STATIONS FOR MACHINERY, IMPLEMENTS, AND TOOLS USED IN AGRICULTURE AND DAIRYING.

By F. WITTING, Graduate of Alnarp Agricultural College, Sweden.

When a farmer or a dairyman is going in for a machine or an implement, he, as a rule, experiences a vast amount of trouble in the selecting of a good and serviceable article, and, having such an enormous variety of makes and constructions to choose from, he gets perfectly confused, and does not know which one to secure.

The country is literally swarmed with machinery of different brands, types, and constructions, and new machinery is appearing on the market every day of the year. As is the case with patent medicines and bicycles, each manufacturer, of course, claims that his article is the best, with what right we will leave him to state.

Very often inferior articles are introduced into the country and made a great boom of. If the firm advertises freely, or happens to get hold of a smart, pushing, and unscrupulous traveller or agent, the article may be selling at a furious rate, and the business prove to be a rattling good one to the firm, but not so to the poor unfortunate farmer who may happen to swallow the bait. After the purchase is completed, the buyer will usually have cause to regret his bargain. The machine or implement is inferior in either one or another respect. Too late the buyer has gained experience, and will be more wary next time. The agent disappears, and takes great care to keep out of the purchaser's road, for fear he may experience a bad time under the farmer's industrious hands. But the sale still goes on, and some other unfortunate farmer or dairyman will become a helpless prey to the firm.

These remarks do not, however, in any way apply to the well-known and respectable firms who do a large business in Australia in dairying machinery. In such a great agricultural and dairying country as Sweden, it had been a long-felt want to have a place where the different brands and makes of machinery, implements, and tools used in agriculture and dairying could be put through a fair trial, and wherefrom advice as to which sort was the best and most serviceable could be obtained. Such opinion to be given by experts not in any way partial to the manufacturer or his agents.

When in 1896 the De-Laval Separator Company in Stockholm had manufactured its 100,000th machine, the directors of the company, at the suggestion of Dr. Gustaf De Laval, donated a sum of 10,000 kroner (about £600) to the Royal Swedish Agricultural Academy (at that time an institution doing the work of a Department of Agriculture) as a fund towards the establishing of a trial station, where machinery, implements, and tools for agriculture and dairying could be tried by a jury of experts, impartial to the manufacturers, and from which station reports as to the capability and quality of the machines should be published for the instruction and guidance of farmers and dairymen. The Government accepted the offer most readily, and proceeded to work immediately, and without the slightest hesitation, fully recognising the great importance of such trial stations to the farmers. A fair sum of money was added to the amount presented by the Separator Company, and Parliament voted a yearly pecuniary contribution to the station.

As the methods of farming, owing to the differences in soil, climate, and other circumstances, vary to a considerable degree in the different parts of the country, it was considered advisable to establish at least two stations—one in the southern and one in the middle or northern part of the country.

As sites for the stations farms were selected where agriculture was carried out on intense and modern lines, where skilled labourers to work the implements could be found, and where crops of uniform growth (for trials of harvesters, &c.) were at hand. More suitable places than the two Agricultural Colleges—*Alnarp* (Southern Sweden), and *Ultuna* (Middle Sweden), both model farms under Government supervision—could scarcely be found, so it was decided to locate the stations there. The station at Alnarp was separated into two subdivisions—one for agricultural and one for dairy machinery.

Comparative series of trials are held every year at the stations, and manufacturers wishing to place machinery on the Swedish market are invited to take part in the trials. The manufacturers (represented by agents) forward free machines, but the machines are picked out by the jury amongst stock kept for sale to farmers. Any machinery specially got up for the occasion is not allowed to take part in the trials. The manufacturers also supply descriptive drawings and all other information of which the jury may be in need. Those trials are carried out free of charge.

But if the manufacturer desires to have his machine put through a special trial, he can have it done, and is charged a sum equivalent to £5. A report on this trial is published, but is not considered as official.

The jury or committee which has charge of the trials is composed as follows, viz. :—

For agricultural machinery, implements, and tools—

The Teacher of Mechanics and Construction at the College.

The Foreman of Works on the College Farm.

One practical farmer.

One assistant.

One civil engineer.

For dairy machinery implements, and tools—

The Teacher of Dairy-farming at the College.

The Teacher of Chemistry as applied to Dairying and Agriculture at the College.

One practical dairyman.

One civil engineer.

One assistant.

The results of the trials are published officially, and every farmer, as well as the manufacturer or any other person interested in the matter, can obtain a copy for the small sum of 1 krona (1s. 1¼d.). The results are also published in every journal or paper dealing with agricultural or dairy matters. If there are any faults in the machine, either in construction, material used, method of working, or in any other way, these are explained thoroughly.

In the summer of 1896, trials of mowers, reapers, and self-binders were carried out at Alnarp, and as the writer was at that time a student at the College, he had the opportunity of seeing the trials and receiving a very good lesson. Great interest was taken in the trials not only in Sweden but also on the Continent and in America, and all nationalities were represented. Some of the large American and English machinery firms—as for example, McCormick, Osborne, Deering, Massey-Harris, and Walter A. Wood—had sent special representatives. The last-mentioned firm had not less than six men present, all of whom expressed their satisfaction with the fair and absolutely impartial way in which the trials were carried out.

There were tried—9 self-binders, 13 reapers, and 36 mowers. The machines were Swedish, Danish, German, English, American, and Canadian makes.

The points taken into consideration were :—

1. General appearance of machine.
2. Weight of machine.
3. Price.
4. Construction (detailed and illustrated in the report by descriptive drawings and diagrams).

5. Material used in machine (specially tested at the Technical Colleges of Malmo and Stockholm).
6. Power required for work (measured by dynamometer).
7. Time used for cutting a certain area.
8. Width of cutting.
9. Length of stubble left.
10. Work done under unfavourable circumstances (the crop lodging).
11. Binding.
12. Prices of spare parts.

In all the trials the representatives for the firms were not allowed to interfere with the machines, but had only to fix them up and hand them over in working order. To each machine was allotted an area of 1 acre, being a part of a field carrying all over it the same density of growth. The reapers and binders were tried on wheat, rye, oats, and barley; the mowers on artificial pasture—chiefly Timothy and clover. Each machine was driven by the same man (a student at the Lower Agricultural College), and the same pair of horses was used.

Every kind and description of machinery, implement, and tools has since then been submitted to trials.

The establishing of the stations met with the greatest enthusiasm amongst the farmers, as they at once recognised and appreciated the helping and protecting hand held out to them.

Although the manufacturers at first grumbled, they very soon realised the benefit they could reap from the trials. They would have the opportunity of having faults, which they might have overlooked, detected. And, furthermore, they would receive advice from experts how to remedy those faults, and how to improve on the machine. Two kinds of machinery, especially the manure distributor and the potato harvester, were very unserviceable machines when they were tried for the first time, but now they have very nearly reached perfection, thanks to these trials.

At shows, consideration is only taken of machinery, implements, and tools that have been previously tried, and the reports serve as a guide to the judges. If I am not mistaken, it has been stipulated that no other machinery, implements, or tools are entitled to compete except those that have been tried. Quite right, too!

The trials seem to have done a vast amount of good, and the Swedish farmers and dairymen wonder now how they had managed to live so long without having trial stations. Farmers now know what implements to buy and which to avoid. All fraud in this line is rendered quite impossible, and the machinery business is placed on a sound basis.

From what I have seen of farming in Queensland, I would think that such trial stations ought to be established here, and I am sure they should be of great assistance to the farmers.

The matter is not connected with heavy expenses, and could be carried out quite easily by the Government. As sites for the stations we have the Agricultural College at Gatton and the Experimental Farms.

It may be said by some people that the machinery which is introduced into Queensland has previously been tried in America and England, and found to be serviceable. This may be true, but if the article is suitable for Queensland circumstances is another question. I will just quote an experience in Sweden: The self-binders had been tried in the States and in other countries, and proved to be suitable for the purpose, but when introduced into Sweden it was found that the straw of the wheat and rye in Sweden was of a different sort to that in the aforesaid countries, being longer. This matter necessitated alterations on the binders, the board had to be extended, and the packers shifted.

GRASS ENSILAGE.

Although, as will be seen by the article in this issue on grass ensilage, by Mr. J. Mahon, little is heard of making grass ensilage in Queensland, yet in the sandy districts of Flanders, where the principal food of milking cows is turnips, these are very often frozen in severe seasons, and the cattle would, therefore, go very short were it not that there is a great extent of grass land in that country. So rank does this grass grow that there is far more than enough for the cattle; therefore, instead of making it into hay, it is turned into ensilage, in the following manner:—

The grass is mown between May and June, and is at once carried and placed in a stack. A stack contains about 118 loads of grass of 22 cwt. each.

Care is taken not to put too thick a layer on at a time, so as always to allow the under layer to heat to the required temperature of 130 degrees to 150 degrees Fahr. For this reason, not more than 1 yard to 1½ yards are added each day. A stack thus constructed in 1899 measured 13 yards in length, 4½ yards in breadth, and 2¼ yards high. It stood on the ground which had been dug out to a depth of 18 inches. Pressure was given by means of pieces of old iron and blocks of stone. Making allowance for the damaged portion, varying from 1 inch to 1 foot of the surface exposed to the air, the bulk of the stack was 130 cubic yards. Five months after the stack was built, the weight of a cubic yard of ensilage was taken. One yard of the upper part weighed 1,000 lb., 1 yard of the middle part weighed 1,400 lb., 1 yard of the lower part weighed 1,500 lb. On an average, a yard weighed 1,300 lb. The total weight, making allowance for the spoiled outside, was 170,000 lb., or about 75 tons. The ensilage was of excellent quality, and formed a portion of the daily ration of the cattle.

CAPE WEED.

Many inquiries having reached the Department of Agriculture as to the good or bad properties of the Cape Weed, the Colonial Botanist, Mr. F. M. Bailey, was requested to investigate and make a report on the subject. The following report should to some extent allay any fears as to the weed becoming what is known as a noxious weed or a dangerous plant. Mr. Bailey says—"The Cape Weed has been introduced to many localities in the Southern part of this State, where hay, imported from the Southern States, has been used for feeding stock during the late severe drought. I do not think that the weed is likely to prove a great pest, as it has been introduced, year after year, for the past forty years, by the same means, and, although I have closely observed it during this time, have never found it to take kindly to our climate. Two reasons may be given for its being so much more in evidence at present than in former years. Firstly, Southern hay has been more largely imported and more widely distributed. Secondly, the winter has been a wet one—that is, we have experienced a succession of showers throughout the winter months, which, while being unusual with us, assimilates somewhat to the conditions of the Cape and also to that of the Southern States. Our usual hot, wet summer will, I believe, be against the preservation of the seed, and it is probable that very few of the seeds now maturing will retain their germinating power until next winter if left to themselves.

Dairying.

THE DAIRY HERD—QUEENSLAND AGRICULTURAL COLLEGE.

JULY TO SEPTEMBER.

Returns from 1st to 31st July, 1903.

Name of Cow.	Breed.	Date of Calving.	Yield of Milk.	Per cent. Butter Fat, Babcock Test.	Commercial Butter.	Remarks.
			Lb.		Lb.	
Amy ...	Ayrshire	14 Feb., 1903	419	3·6	16·89	
Blink ...	"	27 April "	725	3·9	31·76	
Lass ...	"	11 July "	375	3·6	15·12	
Linnet ...	"	16 Sept., 1902	520	3·6	20·96	
Lowla ...	"	30 Oct. "	332	3·9	14·50	
Laura ...	"	12 July "	535	3·7	22·17	
Leasome ...	"	27 Feb., 1903	1,050	3·6	42·33	
Lonesome ...	"	28 Feb. "	382	3·6	15·49	
Lena ...	"	26 Feb. "	688	3·8	29·28	
Ream Ruthi	"	4 Feb. "	436	3·6	17·57	
Ruth ...	"	18 Dec., 1902	560	3·7	23·20	
Ruby ...	"	24 July "	435	3·8	18·51	
Ream ...	"	10 Jan., 1903	108	4·2	5·08	Dry, 20-7-03
Rosebud ...	"	4 Dec., 1902	562	4·1	25·80	
Renown ...	"	18 April, 1903	604	3·9	26·38	
Connie ..	Jersey	5 May "	603	4·1	27·68	
Effie ...	"	25 Dec., 1902	436	4·3	20·99	
Eileen ...	"	4 Nov. "	310	5·1	17·70	
Ivy ...	"	24 Oct. "	96	6·0	6·45	Dry, 16-7-03
Jersey Belle	"	17 Jan. "	89	5·6	4·98	Dry, 16-7-03
Carrie ...	"	15 Sept. "	370	4·4	16·75	
Belle ...	"	8 July, 1903	334	4·2	15·71	
Playful ...	"	7 July "	614	4·0	27·50	
Stumpy ...	"	4 June "	1,050	4·2	49·39	
Alice ...	Shorthorn ...	28 April "	623	4·0	27·91	
Dora ...	"	12 Jan. "	458	3·6	18·46	
Horney ...	"	4 May "	518	3·5	20·30	With first calf
Kit ...	"	27 Nov., 1902	644	3·7	26·77	
Louisa ...	"	3 Jan., 1903	605	3·6	24·39	
Nestor ...	"	31 July, 1902	412	4·0	18·45	
Plover ...	"	29 April, 1903	318	3·6	12·82	
Queenie ...	"	2 Sept., 1902	332	3·5	13·01	
Restless ...	"	23 April, 1903	533	3·6	22·29	
Violet ...	"	6 Dec., 1902	340	4·0	15·23	
Tottie ...	"	12 July, 1903	320	3·3	11·82	With first calf
Rose ...	"	21 July "	222	3·5	8·70	
Bess ...	Grade Shorthorn	1 April "	414	3·8	17·61	With first calf
Rowly ...	" " ...	27 May "	552	3·6	22·25	
Rachael ...	" " ...	30 Mar. "	380	3·8	16·17	
Vera ...	" " ...	9 Mar. "	370	3·6	14·91	
Lemon ...	" " ...	27 July "	180	3·6	7·25	With first calf
Angel ...	Holstein Devon ...	1 Feb. "	478	3·8	20·34	
Whitefoot ...	" " ...	27 April "	468	3·6	18·86	
Magpie ...	" Sh'rth'rn	14 May "	672	3·6	27·09	With first calf
No. 46 ...	Ayrshire Sh'rth'rn	8 April "	530	4·1	24·33	
No. 48 ...	" " ...	8 April "	557	4·4	27·44	
Nina ...	" " ...	28 Mar. "	370	3·7	15·33	
Nancy ...	" " ...	12 April "	560	3·7	23·25	
Tussle ...	" " ...	10 Mar. "	432	3·8	18·38	
Haze ...	" " ...	3 June "	616	3·7	25·52	
Blank ...	Ayrshire Jersey	25 Mar. "	633	3·8	26·94	
Ohio ...	" " ...	...	545	3·3	20·14	With first calf
Lady Rose ...	Guernsey ...	2 April, 1903	312	4·4	15·37	
Pansy ...	Jersey Grade ...	16 July "	305	3·9	13·33	

Returns from 1st to 31st August, 1903.

Name of Cow.	Breed.	Date of Calving.	Yield of Milk.	Per cent. Butter Fat. Babcock Test.	Commercial Butter.	Remarks.
			Lb.		Lb.	
Amy ...	Ayrshire	14 Feb., 1903	423	4·1	19·88	
Blink ...	,, ...	27 April ,,	704	3·7	29·17	
Lass ...	,, ...	11 July ,,	325	3·6	13·10	
Linnet ...	,, ...	16 Sept., 1902	541	3·8	23·02	
Lowla ...	,, ...	30 Oct. ,,	314	3·6	12·66	
Laura ...	,, ...	12 July ,,	532	3·6	21·45	
Leasome ...	,, ...	27 Feb., 1903	987	3·8	42·00	
Lonesome ...	,, ...	28 Feb. ,,	342	3·7	14·17	
Ream Ruthi	,, ...	4 Feb. ,,	562	3·6	22·65	
Ruth ...	,, ...	18 Dec., 1902	575	3·8	24·47	
Ruby ...	,, ...	24 July ,,	444	3·6	17·90	
Rosebud ...	,, ...	4 Dec. ,,	607	3·7	25·15	
Renown ...	,, ...	18 April, 1903	631	3·6	25·44	
Laverock ...	,, ...	19 Aug. ,,	400	3·5	15·68	
Lottie ...	,, ...	28 Aug. ,,	37	3·5	1·45	With first calf
Connie ..	Jersey	5 May ,,	540	4·2	25·4	
Effie ...	,, ...	25 Dec., 1902	405	4·5	20·41	
Eileen ...	,, ...	4 Nov. ,,	315	4·8	16·93	
Carrie ...	,, ...	15 Sept. ,,	342	4·6	17·61	
Stumpy ...	,, ...	4 June, 1903	1,119	4·3	53·89	
Playful ...	,, ...	7 July ,,	982	4·5	49·49	
Belle ...	,, ...	8 July ,,	493	4·3	23·74	
Alice ...	Shorthorn ...	28 April ,,	588	4·2	27·65	
Dora ...	,, ...	12 Jan. ,,	460	3·7	19·06	
Horney ...	,, ...	4 May ,,	437	3·6	17·61	With first calf
Kit ...	,, ...	27 Nov., 1902	654	3·6	26·36	
Louisa ...	,, ...	3 Jan., 1903	643	3·7	26·64	
Nestor ...	,, ...	31 July, 1902	523	3·8	22·25	
Plover ...	,, ...	29 April, 1903	323	3·8	13·76	
Queenie ...	,, ...	2 Sept., 1902	423	3·7	17·52	
Restless ...	,, ...	23 April, 1903	536	3·7	22·21	
Violet ...	,, ...	6 Dec., 1902	487	3·7	20·18	
Tottie ...	,, ...	12 July, 1903	503	3·5	19·71	With first calf
Rose ...	,, ...	21 July ,,	989	3·6	39·87	
Bess ...	Grade Shorthorn	1 April ,,	401	3·6	16·16	With first calf
Lemon ...	,, ,, ...	21 July ,,	614	3·7	25·44	
Rowly ...	,, ,, ...	27 May ,,	523	3·5	20·50	
Rachael ...	,, ,, ...	30 Mar. ,,	370	3·7	15·33	With first calf
Vera ...	,, ,, ...	9 Mar. ,,	364	3·6	14·67	With first calf
Esmie ...	,, ,, ...	19 Aug. ,,	105	3·5	4·11	
Angel ...	Holstein Devon...	1 Feb. ,,	523	3·9	24·85	
Whitefoot ...	,, ,, ...	27 April ,,	601	3·7	24·90	
Night ...	,, ,, ...	12 Aug. ,,	363	3·8	15·44	
Magpie ...	Holstein Sh'rth'rn	14 May ,,	666	3·6	26·85	With first calf
No. 46 ...	Ayrshire Sh'rth'rn	8 April ,,	455	4·1	20·89	
No. 48 ...	,, ,, ...	...	489	4·0	21·90	
Nina ...	,, ,, ...	28 Mar. ,,	403	3·5	15·79	
Nancy ...	,, ,, ...	12 April ,,	581	3·6	23·42	
Tussle ...	,, ,, ...	10 Mar. ,,	388	3·6	15·64	
Haze ...	,, ,, ...	3 June ,,	632	3·6	25·48	
Blank ...	Ayrshire Jersey	25 Mar. ,,	570	3·9	24·89	
Ohio ...	,, ,, ...	...	545	3·6	21·97	With first calf
Pansy ...	Jersey Grade ...	16 July, 1903	942	3·9	41·14	
Lady Rose ...	Guernsey ...	2 April ,,	301	4·7	15·84	
Lena ...	Ayrshire ...	26 Feb. ,,	674	3·6	27·7	

RETURNS FROM 1ST TO 30TH SEPTEMBER, 1903.

Name of Cow.	Breed.	Date of Calving.	Yield of Milk.	Per cent. Butter Fat, Babcock Test.	Commercial Butter.	Remarks.
			Lb.		Lb.	
Amy ...	Ayrshire	14 Feb., 1903	558	4·0	24·99	
Blink ...	,, ...	27 April ,,	677	4·6	34·87	
Lass ...	,, ...	11 July ,,	437	4·0	19·47	
Linnet ...	,, ...	16 Sept., 1902	548	3·8	23·32	
Laura ...	,, ...	12 July ,,	464	3·6	18·70	
Lowla ...	,, ...	30 Oct. ,,	468	4·0	20·96	
Lena ...	,, ...	26 Feb., 1903	1,100	3·7	45·58	
Ream Ruthi	,, ...	4 Feb. ,,	593	3·5	23·24	
Ruby ...	,, ...	24 July, 1902	382	4·1	17·54	
Ruth ...	,, ...	18 Dec. ,,	585	3·8	24·89	
Rosebud ...	,, ...	4 Dec. ,,	744	4·2	34·99	
Renown ...	,, ...	18 April, 1903	606	4·2	28·5	
Venus ...	,, ...	6 April ,,	415	4·6	21·38	With first calf.
Laverock ...	,, ...	19 Aug. ,,	1,245	3·4	47·40	
Lottie ...	,, ...	28 Aug. ,,	681	3·9	29·74	With first calf.
Bonnie ...	,, ...	22 Sept. ,,	192	4·0	9·21	
Lonesome ...	,, ...	28 Feb. ,,	388	3·6	13·22	
Leasome ...	,, ...	27 Feb. ,,	906	3·7	37·54	
Honey ...	,, ...	14 May ,,	513	3·8	21·8	With first calf.
Connie ...	Jersey	5 May ,,	590	4·3	25·8	
Effie ...	,, ...	25 Dec., 1902	400	3·9	17·42	
Eileen ...	,, ...	4 Nov. ,,	503	5·7	32·11	
Playful ...	,, ...	7 July, 1903	732	5·0	40·99	
Belle ...	,, ...	8 July ,,	481	4·8	25·85	
Stumpy ...	,, ...	4 June ,,	867	5·0	48 55	
Carrie ...	,, ...	15 Sept., 1902	247	4·5	12 44	Dry, 30-9-03.
Nestor ...	Shorthorn ...	31 July ,,	495	5·1	28·28	
Plover ...	,, ...	29 April, 1903	597	3·4	22·73	
Queenie ...	,, ...	2 Sept., 1902	380	3·4	14·47	
Restless ...	,, ...	23 April, 1903	411	3·8	17·49	
Violet ...	,, ...	6 Dec., 1902	561	3·8	23·87	
Tottie ...	,, ...	12 July, 1903	564	3·2	20·21	With first calf.
Rose ...	,, ...	21 July ,,	836	3·6	33·70	
Dott ...	,, ...	30 Sept. ,,	20	3·6	·80	
Alice ...	,, ...	28 April ,,	655	4·4	32·27	
Dora ...	,, ...	12 Jan. ,,	617	3·5	24·18	
Kit ...	Shorthorn ...	27 Nov., 1902	586	3·9	21·59	
Louisa ...	,, ...	3 Jan., 1903	672	4·0	30·10	
Bess ...	Grade Shorthorn	1 April ,,	419	4·3	20·17	With first calf.
Lemon ...	,, ,, ...	21 July ,,	779	3·6	31·40	
Rowly ...	,, ,, ...	27 May ,,	576	4·0	23·11	
Rachael ...	,, ,, ...	30 Mar. ,,	382	3·9	16·68	With first calf.
Vera ...	,, ,, ...	9 Mar. ,,	386	3·9	16·79	With first calf.
Angel ...	Holstein Devon...	1 Feb. ,,	523	3·9	24·85	
Whitefoot ...	,, ,, ...	27 April ,,	571	3·6	23·02	
Night ...	,, ,, ...	12 Aug. ,,	815	4·4	40·16	
Mona ...	Holstein Sh'rth'rn	8 Sept. ,,	850	3·8	36·27	
Reanie ...	,, ,, ...	22 Sept. ,,	250	3·4	9·52	
Magpie ...	,, ,, ...	14 May ,,	684	3·4	26·04	With first calf.
No. 46 ...	Ayrshire Sh'rth'rn	8 April ,,	443	5·0	24·8	With first calf.
No. 48 ...	,, ,, ...	8 April ,,	525	4·6	27·04	With first calf.
Nina ...	,, ,, ...	28 Mar. ,,	427	4·2	20·08	With first calf.
Nancy ...	,, ,, ...	12 April ,,	679	3·8	28·89	With first calf.
Tussle ...	,, ,, ...	10 Mar. ,,	391	4·0	17·51	With first calf.
Haze ...	,, ,, ...	3 June ,,	596	3·6	24·03	With first calf.
Blank ...	Ayrshire Jersey...	25 Mar. ,,	437	4·5	22·02	With first calf.
Ohio ...	,, ,, ...	...	531	3·0	17·84	With first calf.
Lady Rose ...	Guernsey ...	2 April, 1903	198	5·5	12·19	
Esmie ...	Shorthorn Grade	19 Aug. ,,	433	3·4	16·48	With first calf.
Pansy ...	Jersey Grade ...	16 July ,,	903	4·0	40·45	

RESULT OF TWENTY-FOUR HOURS' MILKING COMPETITION.

AT THE SHOW OF THE SOUTHERN QUEENSLAND AND BORDER AGRICULTURAL AND PASTORAL ASSOCIATION, 9TH OCTOBER, 1903.

The following is a detailed result of the twenty-four hours' milking contest:—

	Owner.	Name of Cow.	Lb. of Milk.	Test.	Lb. Butter.	Totals, Morning and Evening.
MORNING.	I. Andrews	Buttercup	$16\frac{5}{8}$	5	·93	1·60
	R. Weedon	Delia	$19\frac{1}{8}$	3·6	·77	1·42
	I. Andrews	Topsy	$18\frac{1}{8}$	4	·81	1·37
	"	Sally	$17\frac{7}{8}$	4	·80	1·30
	Stephens and Stanfield...	Pansy	$22\frac{1}{4}$	2·4	·69	1·29
	" " ...	Cherry	$15\frac{1}{8}$	2·8	·47	1·26
EVENING.	I. Andrews	Buttercup	12	5	·67	
	R. Weedon	Delia	$14\frac{1}{8}$	4	·65	
	I. Andrews	Topsy	$10\frac{7}{8}$	5	·56	
	"	Sally	14	3·2	·50	
	Stephens and Stanfield...	Pansy	15	3·6	·60	
	" " ...	Cherry	$13\frac{7}{8}$	5·1	·79	

WEIGHING *VERSUS* MEASURING OF THE CREAM FOR TESTING PURPOSES.

By F. WITTING, Graduate of Alnarp Agricultural Farm, Sweden.

In various lines of practical business it has over and over again been proved that of the two different modes of obtaining a certain quantity—that of weighing or that of measuring—the former gives the more accurate result. So is also the case with quantities of milk and cream, and it is most suprising that measuring is still so much in vogue.

The specific gravity of the milk varies to a great extent, and this variation can only be ascertained by either weighing or the use of a lactometer.

Furthermore, the amount of air (in the form of froth and the so-called "swollen" milk or cream) contained in the cream will have some influence on the measured quantity, but not so on the weighed.

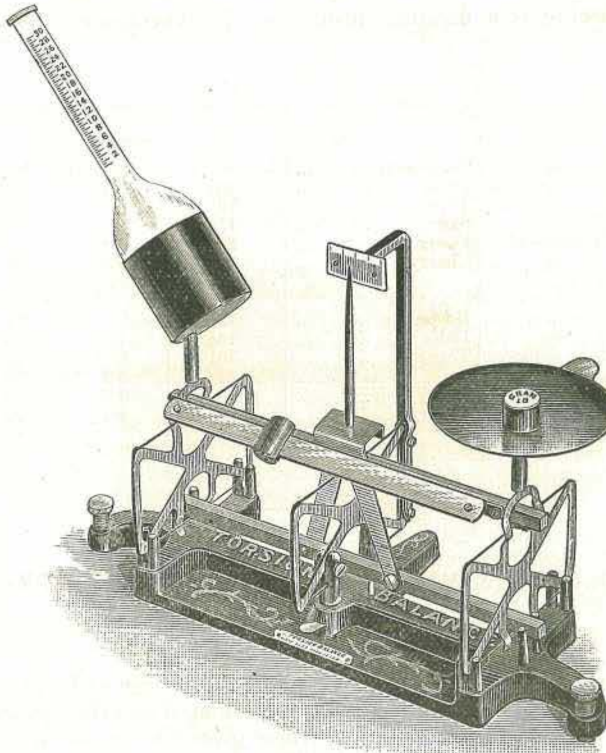
In obtaining a certain volume of milk or cream for testing with the Babcock tester, measuring with a graduated pipette has hitherto been the mode adopted by dairymen and butter-makers. However, this has not always proved to give satisfactory and accurate results.

Specially if the butter-maker wishes to arrive at a test of which there is not the slightest doubt regarding its accuracy, weighing is the only way of coming to this point.

Lately the attention of the dairymen and butter factory owners in the south has been drawn to a small apparatus, in the form of a scale with "taré system," and called the "The Torsion Cream Balance." Many dairymen have expressed themselves absolutely in favour of this apparatus and method of obtaining a certain quantity of milk or cream.

This apparatus has now been brought into Queensland by the enterprising firm of Messrs. W. A. Preston and Co., Brisbane; which firm has introduced quite a number of useful dairy utensils, and to which the Queensland dairymen owe hearty thanks for the assistance rendered by the firm in promoting the development of dairying in the State.

The Torsion Cream Balance is a very neat little apparatus, very well arranged, and extremely sensitive, which latter character makes it a good substitute for an ordinary apothecary's scale in the dairy laboratory.



When once the operator has got used to the handling of the scale, it is very easily manipulated.

We will here briefly give a hint how to work it.

First: *To Balance the Cream Flask.*—Place flask in holder on left hand, and 18 gramme weight on pan on right hand. Press the lever at front of base to release balance. Slide counterpoise weight along the front bar till the pointer swings free across the scale plate. (Sometimes an extra heavy flask will need a coin or small piece of metal added to the 18 gramme weight.) Slightly turn either the right or the left hand basal screw till the pointer swings exactly the same distance each side of the scale plate.

Second: *To Weigh the Cream Sample.*—Place 9 gramme weight also on pan. Take 8.75 c.c. of cream and blow into flask; then add more cream, drop by drop from pipette, till it weighs the flask down, and the pointer again swings evenly across scale plate (9 c.c. distilled or rain water is added *after* sample is weighed).

As we said before, in the south, dairymen and butter factory owners have come to recognise the good points in the scale and the method, and have adopted it to a great extent. In Queensland, so far, the factory managers are not acquainted with the instrument.

The Horse.

IMPROVEMENT OF HORSE STOCK.

BY ERNEST A. SMITH.

The Report of the Select Committee on this subject will be found interesting reading by all those who are conversant with the subject. The Committee, under the presidency of the Hon. J. T. Bell, M.L.A., not only took exhaustive evidence on the subject, but have arrived at conclusions which will very generally commend themselves to the horse-loving public. The Committee base their Report on the premises that the universal consensus of opinion was that the horse stock of Queensland have deteriorated and are still deteriorating, and that some remedial measures are necessary. It has long been apparent that a large amount of money is being annually lost to the State on account of the careless manner in which the breeding of horses is all too generally conducted. In order to effect improvement, it is evident that sufficient inducement must be offered to the breeder to use only stout and serviceable stallions as well as mares of good type and soundness. This the Select Committee propose to do by offering premiums to suitable stallions, such stallions to serve approved mares at a low figure, which is the plan which has been advocated before in these columns. The money to provide the necessary sinews of war is, however, proposed to be raised by a stallion tax, ranging from £2 to £10, to be levied by stallion boards which are to be formed throughout the State. This provision is a good one, as it means an extension of local government in this connection which should tend to prevent the tax from being as unpopular as might otherwise be the case. Whether the board should have the large powers proposed by the Committee appears open to argument, for, if it happened that a stallion board was composed of persons personally interested, it might occur that the working would not be so satisfactory as might be the case if boards were acting under the advice or under the direction of a skilled Government official. However, the Report presents the alternative of the board being nominated by the Governor in Council, a course which will be probably found more advisable at the commencement. The fact that the Committee recommend that legislation be passed to remedy the present very unsatisfactory condition of racing is noticeable, and I think might be extended with advantage. For one thing, two-year-old racing should be prohibited before 1st January at the earliest. Then again the raising of the minimum handicap weight from 6 st. 7 lb. to 7 st. would of itself do little good so long as the minimum top weight of 9 st. remained unaltered. To effect an improvement in this direction, the lowest weight should not only be 7 st., but the minimum top weight 9 st. 7lb. This would ensure that fairly good loads would have to be carried in all handicaps, and would tend to the encouragement of a stouter class of horses. Also, as to 6-furlong races, this should not include two-year-olds, for whom 5-furlong races should be allowable. Three races of a mile or over should also be made obligatory on every racing programme. The recommendation that Government thoroughbred and Suffolk Punch stallions be stationed wherever practicable is a most valuable one, but it involves the expenditure of a considerable amount of money which may not be considered a serious objection when the long-expected better times arrive. The Committee, moreover, in the concluding paragraph of the Report, point to what the Government of New Zealand has done in the establishment of stud farms and the importation of stallions of the highest class. In New Zealand, part of the totalisator tax is, I think, appropriated for this purpose (as, indeed, is the case in France), and there is every reason that the same course should be adopted in Queensland as soon as practicable.

There can be no doubt that these recommendations when embodied in the form of a Bill should meet with considerable support in Parliament, for the conclusions arrived at bear every mark of being thoroughly well considered and being the result of the opinion of a large number of experts, who all agree that remedial measures are urgently required. But, independently of such legislative action, there can be no doubt that a considerable amount of good might be done by capable administration. To enable the Queensland breeder to reap the desired benefit of a higher price for his product, it is necessary that he should be brought into direct touch with the English and Indian remount officials. It is well known that, at the present time, it is the middlemen who make all the profit, as they seldom buy a horse on which they cannot make a profit, which may be fairly estimated from 75 to 100 per cent. Now, this desirable result of doing away with the middlemen may be obtained by Government inspection and the formation of depôts in various parts of Queensland, where the Imperial or other buyer could inspect and purchase the class of horse best suited to his requirements. The very fact of the breeder thus receiving a much better price would not only have the effect of bringing a large amount of money into the State, but would also tend to ensure more judicious breeding and more care being taken of the young stock. Thus horses would become valuable property, and their breeding one of the most remunerative of our local industries.

Under the system of careful selection by a skilled Government official and the collection of the suitable horses into depôts, there would be no danger of the good name of Queensland horses being brought into disrepute by the exportation of buckjumpers or horses possessed of other undesirable qualities, as was shown to have been done in the case of the sale of remounts to the Imperial Remount Officer, for service in South Africa, by the evidence given in the Report of the Select Committee on the Improvement of Horse Stock under the presidency of the Hon. J. T. Bell, M.L.A.

It is satisfactory to find that, as it were, we have at last turned the corner, and that the indifference and neglect with which this important subject has long been treated have at last disappeared. It is sincerely to be hoped that the report of the Committee may mark the commencement of an era in which the horse industry may (in common with others) receive the attention from the Government which it so justly deserves.

A GOOD STALLION.

There is always something of interest about a good horse which attracts city as well as rural dwellers. The horse here illustrated is a case in point.

Duke of Vermont, by Lord Vermont out of Gipsy Queen from Vermont Jr. (imported), by Vermont, dam by General Taylor, is the property of Mr. W. C. Thurlow, of Lower Clifton street, Red Hill.

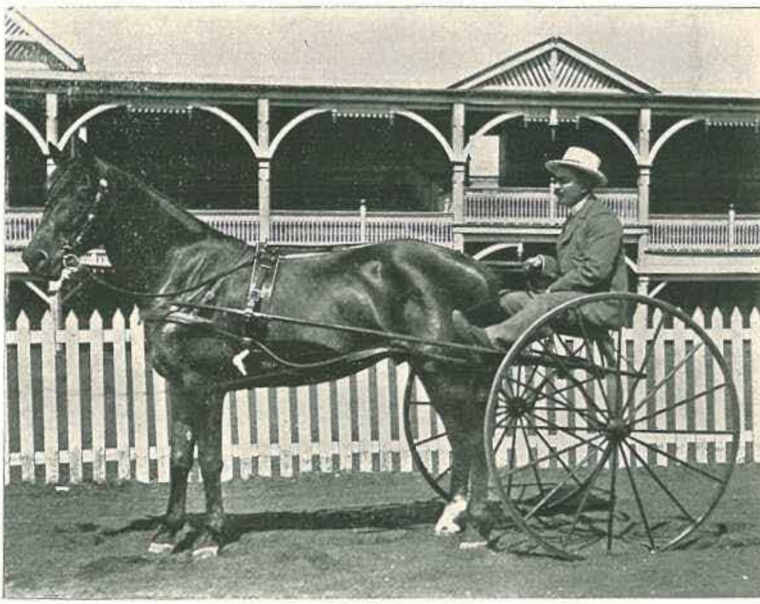
In 1898 he was awarded four first and special prizes in the three-year-old American Trotting Class at Beenleigh in one day, and was placed second as a hackney stallion at the National Association's Exhibition. In 1899 as a four-year-old American trotter he was placed third against such horses as Harold and Lord Beldon (aged horses), and received the special prize given by Lieutenant-Colonel James Irving, M.R.C.V.S.L., for Queensland-bred American trotting stallion, judged for points and pace.

In 1903 he took the first and only prize at the Beenleigh Show against six competitors.

Duke of Vermont is a beautiful bright bay, standing just under 16 hands, and carries himself with a perfectly natural elegance which he seems to impart to all his foals. He is one of the best-tempered and quietest stallions it is possible to meet with.

We understand that Duke of Vermont will stand during the coming season at the above address, and that the fee is such as will afford an opportunity to other than wealthy men to avail themselves of his services.

Plate XXXVII



Trotting Stallion, "Duke of Vermont."

PREVENTION OF SORE BACKS ON HORSES.

A horseman of the West writes as follows on the above important subject to the *Pastoralists' Review*:—

Perhaps a good many of your readers in the several States are unaware of the principal cause of sore backs and shoulders among working horses.

The main cause contributing to this annoying state is allowing the hair of the animal to become matted or rolled by the chafing of collar or saddle into small hard knots, which, when caked with sweat and dust or scurf from the animal, cause friction upon the outer cuticle of the skin.

To alleviate this trouble, let horsemasters use a pair of clippers upon any part of an animal that comes in contact under hard pressure with any collar or saddle, and remove the hair from the part in question as closely as may be, and common sores will diminish 80 per cent. amongst working stock, especially in quarters where a brush and curry comb are regarded as superfluous.

Some say clipping disfigures a horse. Well, a raw sore does more so; and this is not a cure, but a preventive.

To horsemen whose business it is to ride hard and far, such as stockmen on large cattle runs, pack mailmen, &c., I can recommend this measure, especially during the summer months, and another also.

Most men, when their working stock or hacks commence to develop or have developed a sore back, pad the back under the saddle with a horsehair mat, old blanket, or rolled saddle-cloth, in order to soften the effect of a hard saddle.

This is an old custom, and will probably die hard. It is certainly humane when an animal is suffering badly. But, provided a saddle is evenly padded, and free from any indentation or protuberance of the stuffing, however small, it cannot be too hard against the back. The trouble lies in having it soft. The Mexicans (renowned horsemen) ride virtually on the hickory tree. Iron horse-collars are allowed by law. Whoever thinks of padding a bullock yoke?

Therefore, let horsemen see that their saddle stuffing be even; throw away all artificial padding, and use a saddle-cloth of a waterproof material that will not absorb the sweat, and sore backs derived from pack or saddle will be reduced to a minimum.

WEST INDIAN COTTON.

Every month brings news of the increasing scarcity of cotton in the British market, and of the distress amongst the Lancashire cotton-spinners, owing to the closing of mills, consequent upon the want of the raw material. As a result, in nearly all tropical British colonies, as well as in French and German possessions, the cotton-growing industry is rapidly expanding. Queensland, with its enormous area of soil suitable for cotton-growing, and with the right climate and rainfall, stands alone in its indifference to a crop which at one time covered the lands of East and West Moreton with the houses of well-to-do farmers who owed their prosperity to the cotton industry.

A correspondent sends us the following extract from the *Times Weekly Edition* on the subject:—Some interesting evidence of the stage of perfection in cotton-growing which has been achieved in the British West Indies as a result of the efforts of the British Cotton-growing Association was afforded in Liverpool lately, when Messrs. Hanmer and Co., of that city, sold nearly 200 bales of perfect West Indian cotton at 13½d. per lb. The cotton, which was grown from Sea Island seed, had a long and silky staple. The same firm hope to receive a continual supply of such cotton.

Although we do not think that Sea Island cotton would be the best variety to grow in Queensland, at any rate in the South, still there are excellent varieties of short-stapled kinds which bear heavily in our Southern climate, and which could be produced in conjunction with other crops, to the great benefit of the farmers' pockets.

Poultry.

PRACTICAL POULTRY-BREEDING.—No. 4.

By W. HINDES.

There are two systems of feeding chickens, one being called dry and the other wet or mixed feeding. Both are good, if fed carefully; if not, dry food will be found the best. This consists of different cracked grains and seeds, rolled oats, &c. There are at the present time several dealers selling mixed chick feed, but care should be taken that a good article is used. We are using Cyphers' chick feed at the College this season, and the chicks are doing remarkably well on it. They will also thrive on a mixture of the following grains and seeds:—Crushed wheat (10 lb.), crushed maize (10 lb.), rolled oats (20 lb.), canary seed (10 lb.), panicum seed (10 lb.), crushed sunflower seed (10 lb.). It can be put in a trough in a convenient place, where they can always get at it; a little lean meat or green cut bone should also be given daily, and separated milk, if procurable, will also be found good. What is wanted is a well-balanced ration containing sufficient proteids or muscle-forming elements. The above mixture of grains and seeds will be found on analysis to contain about one part proteids to five parts carbo-hydrates; this, most authorities agree, is about the right thing to keep birds in healthy condition; but, as growing chickens make bone and muscle at a great rate, they need more proteids, which will be supplied by the lean meat, green bone, and skimmed milk. Thus, by the above system, all the needs of the chickens will be supplied, with the exception of the green food which must on no account be forgotten. The dry feeding, being less trouble than the other system, is the best for careless feeders, there being no soft food to get sour. It has also been adopted by a number of fanciers, some of whom speak very highly of it; in fact, it is a really good plan if the proper proportions are given. It is particularly good for chickens reared in a brooder, as there is not so much bowel trouble to contend with as when water is used to mix the different meals in the case of wet feeding. Wet feeding will, however, be equally satisfactory if properly carried out. Great care must be taken to see that the soft food is fed in proper quantities; a little and often is the main thing, just as much as the chickens will eat up clean without leaving any to get sour, otherwise there will be trouble with diarrhœa. The soft food should also be well mixed with hot water or skimmed milk into a crumbly mass, but it must on no account be sloppy or sticky, it should crumble easily, or be what bakers would call "mixed short." The first few feeds may consist of hard-boiled eggs chipped up fine, shells and all, mixed with stale bread crumbs or oatmeal. Eggs, however, should not be fed to them too long, or they will cause bowel trouble. Small seeds, such as panicum, should be given after the first day; these will give the gizzard something to do, whereas, if nothing but soft food is given, the digestive organs will get out of order, and indigestion will be the result. Rolled oats or oatmeal, being almost perfect food in itself (chemically), should always form part of the diet for a growing chick after the first few days. Pollard and bran may also be fed, mixed in the following proportions, 3 parts pollard to 1 part bran, or, if preferred, 2 parts pollard and 1 part each of bran and oatmeal, well mixed. If the former mixture be used, rolled oats may be fed by itself twice a day. This, with panicum seed, canary seed, cracked wheat, and occasionally cracked maize, fed alternately, will give a good variety, and good results will accrue. Newly hatched chickens should be fed every two hours, a little at a time, just as much as they will eat up clean, for the first week; four times a day will be sufficient for the next six weeks, then three times a day until they are nearing maturity, after which they can be fed twice a day, the same as the adult fowls. An abundance of fresh cool water should be always before them; this should be changed frequently, and kept shaded from the sun, as sun-warmed water is bad for them. Plenty of green food should also be given them if they have not a good grass run. Lettuce is as good as anything, or lucerne cut up fine. Onion tops and young thistles make a splendid tonic. Another thing that must not be forgotten, especially if they are reared in brooders, is to give plenty of exercise. All the seeds and grain should be fed in litter to make them scratch. Dry bonedust or green cut bone should also be given if they are wanted for future breeders; the dry bone will be found the best, as the chickens will not mature so quickly, and will therefore make larger framed birds; if, however, quick maturity is wanted, green cut bone is the best. Scrupulous attention should be given to cleanliness, both in feeding and housing. Keep the chickens free from lice or they will not thrive. They need plenty of shade from the hot sun, and provision must also be made for wet weather. Keep the chickens busy and contented, and good results will ensue.

IS THE HEN LAYING?

When uncertain whether a hen is laying or not, we may wait till the bird goes to roost and then feel the crop. Except in the case of a glutton, if the crop is only about half full, the chances are that she has left off laying for a time; but if full, she is either in full lay or the eggs are developing in her. Sometimes a hen leaves off laying one batch of eggs and she may not be ready with the next lot for from three to seven days; yet the eggs are growing, her appetite keeps up, and she fills her crop. As a rule, when a hen has a very small crop, she is a poor layer, because a good layer eats much more food, and the crop expands.

GALLINI COTTON.

A correspondent of the *Journal d'Agriculture Tropicale*, living in Abyssinia, was desirous of growing some varieties of Egyptian cotton, and wrote to the editor of the above journal asking if it were true that a new variety, called "Gallini," of exceptional qualities, was about to be substituted for the traditional varieties of that country. The question was referred to a well-known cotton expert, Mons. Victor Mosseri, and that gentleman wrote on the 26th June last from Cairo as follows:—"The cotton called 'Gallini' is nothing but a sub-variety of Sea Island cotton. Like the latter, it was formerly cultivated in Egypt for more than thirty or forty years; to-day its culture has been completely abandoned, and, like the Sea Island, has given place to the varieties 'Suit-afifi,' 'Abbassi,' 'Jannovich,' &c.

The Gallini, which derives its name from the village of Gallin, in the Province of Gharbich (Lower Egypt), thrives better than others on saline soils. The fibre is very fine, and is much appreciated. It is equal to that of the best Sea Island. Nevertheless, on account of its poor yield, its late ripening, and the difficulty of ginning it, it was abandoned at the same time as the Sea Island, whence it originated.

The ginning of the Gallini also presents difficulties, owing to the length of its staple, and its fineness.* The varieties above mentioned and the "Ashmouni" are those which to-day are almost exclusively cultivated in Egypt.

* The roller gin should overcome these difficulties.—ED. *Q.A.J.*

The Orchard.

THE DESTRUCTION OF FRUIT PESTS.

By ALBERT H. BENSON, M.R.A.C.

In the *Agricultural Journal* for April, 1899, I wrote an article on the above subject, a large number of extra copies being reproduced in pamphlet form. The supply of pamphlets having become exhausted, and there being a constant demand from growers for information on this subject, I purpose reproducing what I then wrote, at the same time bringing the information up to date.

As there is probably nothing that causes more loss and annoyance to fruit-growers throughout the colony than the ravages committed by the many insect and fungus pests attacking fruit and fruit trees, I purpose dealing with this very important question in the present number of this *Journal*, and I trust that the information given may be of benefit to many fruit-growers, as it is based on actual experience and is not mere theory. The illustrations accompanying the article are also original, and are reproduced from instantaneous photographs of the actual operations of spraying taken by Mr. F. C. Wills in 1899, and of cyaniding by Mr. W. C. Voller.

SPRAYING.

Shortly after my arrival in this State, I wrote a brief bulletin on spraying; and, as a good deal of the matter contained therein is applicable to the present article, I purpose quoting largely from it. The question of the best methods of destroying fruit pests of various kinds is one that has occupied the attention of gardeners and orchardists for generations, but it is only within comparatively recent years that the various diseases have been made an especial study by scientific men in different parts of the world, especially in the United States of America. The result of the investigations of many scientists has been that, instead of attempting to treat fruit pests by rule of thumb, the life history of many pests has been worked out, their habits studied, and remedies discovered for treating them on scientific lines. The best, most effectual, and most economical method of applying the various remedies was also carefully gone into, with the result that it was proved that mixing the various remedies with water and distributing them over the tree and fruit, in the form of a very fine spray, gave the best results in a very large number of cases. This method of applying remedies is known as "spraying," and has necessitated the manufacture of special pumps fitted with special nozzles with which to apply the spray. There are many kinds of spray pumps and nozzles now manufactured, varying in size from the knapsack spray pump, which is carried on the back of the operator, to powerful force pumps capable of throwing as many as six sprays at once. Several kinds of spray pumps are now obtainable in this colony, most of which are suitable for the purpose for which they are required. In selecting a spray pump, pay attention to the following particulars :—

(1) Never buy too small a pump, as the more powerful the pump the better the work, and the less spraying material you require. If a large pump is too much for one grower, then let several small growers club together and get one good outfit amongst them ; it will be much better to do this than for each grower to have an inferior outfit.

(2) See that the pump is easy to take to pieces for cleaning or packing, and that it is simply and strongly constructed.

Plate XXXVIII.

Fig. 1.

Fig. 2.

KNAPSACK SPRAYING APPARATUS.

Plate XXXIX.

Spraying Pump attached to a Cask on a Sledge.

(3) See that all the valves are of gun metal or brass, as bluestone and sulphur compounds are largely used in spraying, and will corrode all the iron with which they come in contact.

(4) See that you have a good supply of nozzles, for, though one nozzle may be perfect for one purpose, it may be useless for another. All nozzles should be interchangeable.

(5) Knapsack pumps are the best for vines, vegetables, or tobacco; but larger pumps attached to casks or other receptacles are better for orchard use.

When you have purchased a spraying outfit, see that you take care of it. Never put it away dirty, but always run a bucketful of hot water containing a handful of washing soda through it after using. Drain the hose dry, roll it up carefully, clean out all nozzles, and see that all taps work easily, oiling same if necessary. If you do this you will find that your pump will work when you want to use it, but if you do not do it the chances are that just when you want to use the pump that it is out of order and you lose the crop in consequence.

The illustrations herewith give a good idea of the operation of spraying, and of the method of carrying it out. Figs. 1 and 2, Plate XXXVIII., show the method of using the knapsack pump—1st, for spraying vines, vegetables, &c, when a short brass pipe fitted with a Vermorel nozzle is used; and 2nd, for spraying fruit trees up to 10 or 12 feet high, when a bamboo extension 6 to 8 feet long, as shown, is attached to a short hose connected to the pump, the bamboo being fitted to take any nozzle, that shown in the illustration being a triple cyclone nozzle. This pump is an exceedingly handy one for the small fruit-grower who combines the growing of cucumbers, melons, tomatoes, &c., with fruit culture, as it is a good all-round machine, and is easily handled. In using most knapsack pumps, care must be taken not to use kerosene emulsion or kerosene in any form, as the valves are rubber, and are destroyed by kerosene or any other mineral oil. Sulphur-lime compounds also destroy knapsack pumps, particularly when they are made of copper. The particular kind of knapsack spray pump shown in the illustration is known as the "Figaro," and is one that has given us great satisfaction. Its price, as shown in Fig. 1, is £2 2s. 6d. The bamboo and triple cyclone nozzle shown in Fig. 2 are extra.

Plate XXXIX. shows one of Gould's spray pumps fitted on to a cask fixed to a sled, the whole being drawn by a horse. As shown, the pump is fitted with two lines of hose, to which two bamboo extensions are attached. It is a powerful pump, capable of distributing a very fine spray with considerable force, is strongly built, and not likely to get out of order. Gould manufactures several types of spray pumps; and these, together with the Climax spray pumps made by the Nixon Spray Pump Company and the Bean Pump, are about the best of the American-made spray pumps, and cost from £6 to £7 complete. There are also several colonial-made spray pumps that do good work; and of these, those made by Danks and Co., Knowles, and the Doncaster spray pump are about the best. The latter pump is fitted with a special attachment for the use of kerosene without emulsifying, which is giving good results in Victoria.

Of the nozzles in use, I prefer the following: *Vermorel*, *Triple Cyclone*, *Nixon*, and *Bean* or *Seneca*. The two first produce a very fine and wide-spreading spray that can be directed either to the upper or under side of the branches and leaves, and are therefore the best for spraying the outside of the tree. The two last throw a more direct spray with more force, and are therefore better adapted for spraying the trunks, main branches, and inside of the tree. As they do not choke easily, they are also adapted for using thicker sprays, such as those containing lime and sulphur, even when of the consistency of ordinary lime wash.

There are two seasons of spraying—winter and summer; the former is done, when the leaves are off deciduous trees, as soon as the trees have been pruned. It should be very thoroughly done, as it is the main spraying of the year, as owing to the dormant condition of the tree and the absence of leaves stronger remedies can be used and the tree can be more thoroughly sprayed. The best all-round winter remedy is the sulphur, lime, and salt wash; but kerosene emulsion, Bordeaux mixture, and resin and caustic soda wash can also be used. The winter spraying should always be done with a powerful pump, the material used being forced into every crack or crevice, and every part of the tree should be covered. There is no necessity, however, to drown the tree. Fine nozzles that throw upwards or downwards should be used, so as to get the material on both sides of the branches.

Summer spraying is always done with special mixtures, no all-round remedy such as the sulphur, lime, and salt wash being used. Much weaker mixtures are required, and much more care is necessary in their application, so as to prevent injury to the fruit or foliage. Never spray whilst a strong drying wind is blowing, or during a burning hot day, if you can help it; rather spray in the early morning or late in the afternoon. If, however, it is a case of emergency, such as an attack of caterpillars, leaf-eating beetles, or grass-hoppers, then you must spray away whether the weather is favourable or not, even if you do injure a few trees or vines, as it is better to injure a few than to lose the whole.

Sprays cannot be too fine, especially when you are using arsenical poisons or fungicides, and the more evenly they are distributed the better the work they do, and the less material is required. Always prepare your spraying material carefully according to the recipes given; see that it is properly mixed, is carefully strained, and that it is kept well stirred when in use. In the case of Paris green this last is of the greatest importance, as unless the mixture is kept well stirred it soon settles, and that in the bottom of the cask is much too strong, and will do more or less injury to the trees to which it is applied. When using strong kerosene emulsion or strong resin washes, see that the mixture does not run down the trunk and main branches in sufficient quantity to saturate the ground at the collar of the tree, as if this takes place the tree will be injured by the bark being destroyed. Tying a sack round the trunk of the tree close to the ground will prevent this; or the saturated soil may be removed and be replaced by fresh soil.

A little extra care in attending to the details of preparing and applying the mixture, as well as to keeping the pump in good working order, saves a lot of time in the field and gives much better results.

Having now dealt with the application of remedies for the destruction of fruit pests by means of spraying, a few words on the fruit pests themselves and of the remedies for destroying them will not be out of place.

FRUIT PESTS.

The pests attacking fruit and fruit trees are principally of two kinds—first, those caused by insects; and, secondly, those caused by microscopic fungi. There is another class of diseases, probably due to bacterial agency, but of this class very little is known, and no remedies other than keeping the trees in health by proper manuring, drainage, and cultivation can be suggested. Insect pests and fungus pests require, as a rule, different treatment, as remedies which are efficacious in the case of an insect might not be of any use whatever in the case of a fungus and *vice versâ*; hence it is of the greatest importance that fruit-growers should make themselves aquainted with the various pests attacking their fruit or trees, so they can at once tell the cause of the injury and know what remedy to apply. If at any time a grower has the slightest doubt as to whether a disease is caused by an insect or a fungus, then I strongly advise him to send specimens of the disease to the Department of Agriculture for identification, as this will prevent him from applying wrong remedies.

INSECT PESTS.

Insects damage fruit and fruit trees in various ways; consequently different classes of insects require different treatment.

1. *Insects Destroying Foliage, &c.*—A large number of insects—such as caterpillars of all kinds, leaf-eating beetles, crickets, grasshoppers, cut-worms, &c.—do considerable damage by eating the leaves of the tree, skin of the fruit, or bark of small branches. They actually devour their food, not merely suck it; so that if you poison the food on which they are living they will eat the poison and die. The best remedy, therefore, for all this class of destructive insects is to spray the trees or plants on which they are feeding with arsenical poisons, such as Paris green or white arsenic and lime. Paris green is either used alone or may be used in conjunction with lime or with Bordeaux mixture; the latter being the better plan when the trees require spraying for both insects and fungi, as one spraying answers for both.

2. *Insects Living by Suction.*—These insects do a very large amount of damage, and unless they are taken in hand in time are often somewhat difficult to keep in check. All aphides, scale insects, and plant-sucking bugs, such as the bronzy and green orange bugs, are included in this section; and the remedies used are those that destroy the insects by actually touching them, or by so covering them over that they cannot breathe, or by suffocating them by means of poisonous gases. This last method is known as the gas treatment, and is fully described later on. Arsenical poisons are of very little use for these insects, as they only suck the skin or leaves, but do not eat them. The best sprays to use for these insects are resin washes: either a simple resin soap wash in the case of aphides, or a wash consisting of oil, resin, and caustic soda or caustic potash for destroying scale insects, kerosene, kerosene emulsion, either used by itself or in conjunction with resin or a starch solution, extracts of tobacco and nicotine used in conjunction with whale-oil soap, and mixtures of sulphur used in conjunction with lime, soda, or potash.

3. *Insects Boring into the Fruit.*—This class contains some of the worst insect pests, such as the Codlin Moth, Fruit Fly, Yellow Peach Moth, fruit-boring weevils; and these insects have all to be treated more or less differently. However, there is one general remedy for all this class of pests, and that is the careful gathering daily of all fallen and wormy fruit, *especially early in the season;* such fruit to be boiled and fed to pigs. In addition to this, the other remedies that I recommend are as follow:—For the Codlin Moth: Spraying with Paris green, 1 lb. to 160 gallons of water, just as the blossoms fall, repeating the spraying in ten days' time; gathering and destruction of all infested fruit; bandaging the trees as soon as the first crop of larvæ leave the fruit, the bandages to be removed and all larvæ destroyed at least once a week.

The best way to destroy the larvæ is to dip the bandages into boiling water; don't crush the larvæ on the bandages, or the dead insects will attract ants and prevent any other larvæ from harbouring in them. Before placing the bandages on the trees, all loose bark should be carefully scraped off, as the object of placing the bandage round the tree is to provide a convenient shelter for the larvæ. If there is any natural shelter on the tree, then they will hide and pupate there instead of going under the bandages, thus rendering the bandages of little value.

The best remedy for the Fruit Fly is to destroy infested fruit, and thus prevent the larvæ from hatching out. The use of trap trees, and the destruction of all infested fruit on such trees, is also strongly recommended.

For the Yellow Peach Moth, Paris green applied as soon as the fruit sets would destroy a large number of the insects; and again it is advisable to thin the fruits, leaving only single specimens, as this pest is always worst in cases where the fruit is thickly clustered together. The Fruit Weevil: This insect seldom attacks the fruit unless it has been injured by some other pest, sound fruit being seldom attacked.

4. *Insects Boring into the Roots, Stem, or Branches.*—These are true boring insects, and are usually the larvæ of beetles of various kinds. Some of these beetles are leaf-eaters, and can be destroyed by spraying with Paris green; others, again, can be destroyed by placing a cloth under the trees and then giving the branches a few sharp raps, when all the insects will fall to the ground, and can be swept off the sheet and destroyed. When the insects are in the larval or borer stage, if they are of large size they can often be killed by inserting a fine pliable wire into their burrows, or by injecting a small quantity of kerosene or turpentine into the burrows, and plugging up the outlet with a piece of soft wood or clay. In any case when borers are at all troublesome, the mature insects (beetles) should be destroyed whenever and wherever they are found. Spraying with the lime, sulphur, and salt wash is a good preventive, as it acts as a deterrent to the mature insects depositing their eggs on the part sprayed.

FUNGUS PESTS.

The principal fungus pests are caused by very lowly organised microscopic fungi which attack either the leaves, bark, or fruit, sometimes the whole tree. These diseases attack the tree at any time, but the greatest amount of damage is done either when the fruit is setting or when it is ripening. Most of these microscopic fungi are purely surface feeders, and only attack the skin of the fruit, leaves, or bark; and for all such there is one sure remedy, provided that it is applied in time—namely, Bordeaux mixture. All fungus diseases are much easier prevented than cured; hence where they are present it pays to spray the whole of the trees in an orchard, even though many of them have shown no previous sign of disease. Bordeaux mixture destroys the spores (seeds) of these injurious fungi, and the time that the spores are most easily destroyed is just as they are starting into growth. Those fungi that attack the fruit when it is setting—such as the Shot-hole Fungus of the apricot, peach, and plum; the Pear Scab, or Windsor Pear Blight of the pear; the Apple Scab, or Tasmanian Black Spot of the apple; Anthracnose, or Black Spot of the grape—should be sprayed for: First, just when the buds are swelling in spring, and again when the fruit is setting, subsequent sprayings being given as required. The fungi attacking ripening fruit—such as the Bitter Rot of the apple, the Peach Freckle, and the Black Brand (Black Spot) of the orange—can be prevented by spraying the fruit just as it commences to show the first signs of ripening; but this is often unnecessary where the trees have been well sprayed in the early spring.

REMEDIES.

A.

BORDEAUX MIXTURE—A FUNGICIDE.

Winter Strength.—6 lb. bluestone, 4 lb. of unslacked lime, 22 gallons of water.

Summer Strength.—6 lb. bluestone, 4 lb. of unslacked lime, 40 gallons of water.

Prepare as follows (for the 40 gallons solution, the 22 gallons solution in proportion):—

(1) Dissolve 6 lb. of bluestone in 20 gallons of cold water in one cask, by placing it in a bag and suspending it in the water.

(2) Slack 4 lb. of unslacked lime in another cask slowly by first pouring about 3 pints of water over it. This will reduce the lime to a thick cream free from lumps. Water should now be added, stirring well till there are 20 gallons of milk of lime in the cask.

(3) Stir the milk of lime up well, strain it and pour the whole of the 20 gallons of milk of lime and the 20 gallons of bluestone water together slowly into a third cask; stir well for 3 minutes, and if properly made the mixture is fit for use.

The mixture is much better if made in this manner than when a strong solution of bluestone and lime is first mixed together, and water to make up the required quantity is afterwards added.

In order to see if the mixture is properly made, plunge the blade of a knife into it for a minute, If the knife is untarnished the mixture is all right; but if the knife is stained a coppery colour, then more milk of lime must be added.

The mixture should always be neutral, as if there is an excess of bluestone it is apt to injure the foliage. Use water that is free from iron, and do not make the mixture in iron, zinc, or tin vessels of any kind—wood is the best.

If desirable, a stock solution of bluestone may be kept on hand for use as required. Such a solution may be made by dissolving 100 lb. of bluestone in 50 gallons of water. Place the 100 lb. of bluestone in a bag and suspend it in the cask of water, and in the course of a couple of days the whole of the bluestone will be dissolved, and each gallon of the solution will contain 2 lb. of bluestone.

To make the 40-gallon solution you therefore take 3 gallons of the stock solution of bluestone and add 17 gallons of water to it, to make up the 20 gallons of bluestone solution for mixing with the 20 gallons of milk of lime as previously described. A stock solution of milk of lime can also be made, but it is better to make it as required.

Bordeaux mixture is a fungicide, and it is of little value as an insecticide. It, however, combines well with arsenical poisons, in which state it is a very good combined spray.

When fresh lime is hard to procure, washing soda may be used in place of it, the proportion being 6 lb. of bluestone, 9 lb. of washing soda, to 50 gallons of water. It is a good remedy, but not quite equal to Bordeaux mixture.

B.

Paris Green.

Arsenical poisons are the best remedy for all insects that actually devour their food. Paris green is a powerful arsenical poison, and a good sample should contain at least 50 per cent. of arsenious acid. It is generally used by itself, but if desired it can be used with lime, in the proportion of 1 lb. of Paris green to 4 lb. or more of lime. Mixing it with lime tends to make it less dangerous to handle, and will not interfere in any way with its action. It can also be used in conjunction with Bordeaux mixture. The best way to mix Paris green with water is to place it in a cup or billy with a little cold water and thoroughly moisten every particle, the same way as mustard is mixed up for table use; then add more water gradually, stirring well whilst doing so, till it is thoroughly mixed; then add the requisite quantity of water. Paris green is used at a strength not exceeding 1 lb. to 160 gallons of water. It must always be kept well stirred whilst in use. It must not be sprayed on during rain, sunshine, or heavy drying winds. It should not be applied to either fruit or vegetables within a month of the time of gathering. It should be handled with care, and kept out of the way of children. It should always be applied as a very fine spray, and persons spraying should take care not to inhale too much of the spray.

When purchasing Paris green see that you are supplied with a genuine article, such as Blundell's, as the use of inferior brands will result in disappointment and loss. First quality Paris green can be obtained from the wholesale chemists at 1s. 3d. per lb.

When Paris green is used on cabbages it is a good plan to add a little treacle to the water in which it is used, or, better still, to combine the resin and soda wash (D) with it, as this will cause it adhere better.

C.

Kerosene Emulsion.

Take 2 gallons of best kerosene, 1 gallon of boiling water, and 8 oz. of soft soap. Dissolve the soap in the boiling water; when dissolved add the kerosene and churn the mixture with a spray pump or syringe for fully 10 minutes, so as to get the oil and water thoroughly emulsified, when the mixture becomes stable and the oil will not separate from the water, even when kept for a considerable time. If the oil is not thoroughly emulsified and there is free oil present, it is apt to injure the foliage when applied, and if free oil gets on to the roots of the tree in any quantity it will probably kill the tree; therefore it is always best to be on the safe side, and be sure that you churn the mixture till it is properly emulsified. The strength at which kerosene emulsion is applied varies with the trees to which it has to be applied, and with the insects that are to be destroyed. For scale insects on citrus trees, olives, and hard-wooded trees generally, 1 gallon of emulsion added to 7 gallons of water will not injure the tree, except perhaps a few very tender shoots; but when used on peaches, Japanese plums (not persimmons), it must be used much weaker; in fact, I do not recommend it for these trees when they are in leaf, though it is valuable as a winter wash for destroying scale insects. Where peach-trees are attacked with Black Aphis, then the resin and soda wash described later is the better remedy to use. Kerosene emulsion is one of the best remedies for all insects that live by suction, especially scale insects of all kinds. It can be used by itself, or if the trees to be sprayed are covered with fumagine—the sooty fungus which always accompanies certain scale and other insects—it can be used in conjunction with as thick a solution of starch as can be got through the nozzle of the pump. The starch solution is made by making a paste of flour the same as that used by billstickers, and straining it carefully from all lumps. The combined mixture forms a thin coating over the scales, leaves, branches, fruit, &c., which peels off when dry, taking the dead scales and fumagine with it, and leaving the trees clean. In addition to using kerosene in the form of an emulsion, it is now frequently used mixed with water, specially constructed spray pumps being required to mechanically mix the oil and water. When used in this manner, the proportion of kerosene in the mixture varies from 1 in 10 to 1 in 20, or even more, according to the condition of the plant treated and the nature of the pest to be destroyed.

D.

Resin and Soda Wash.

A cheap, weak wash for destroying Aphides, Red Spider, Thrips, and young scales before they are protected by their hard covering, when this remedy is not sufficiently strong to kill them. Take 4 lb. of resin and 3 lb. of washing soda and boil in 2 gallons of water. Add boiling water slowly to make up 5 gallons, taking care that the mixture is boiling all the time. The mixture should be boiled till the resin is thoroughly dissolved, when water to make 40 gallons of wash is added. This wash works easier in the pump, and is more efficacious when applied at a temperature of about 130 degrees. It is a very cheap and efficacious wash, and will not injure the fruit or foliage in the slightest, and it has the advantage of destroying large numbers of aphis-eggs as well as the perfect insects, as it covers them with a thin glaze or varnish of resin which prevents their hatching. It should be applied at any time that aphis are found, except during a very hot or windy day. If it is found that adding water to make 40 gallons makes the wash too weak, then only add enough water to make 30, or even 20, gallons of wash. The sticky nature of this wash clogs the pump if it is not kept clean, and the best way to clean it is to rinse it out with boiling water and soda after using and before putting the pump away.

E.

Resin Wash for Scale Insects.

The following wash is much stronger than the preceding one, and can be used in the place of kerosene emulsion for spraying scale insects. In the case of the Mussel, Glover, and White Scales of citrus trees, and in that of the Mussel Scale of the apple, it is a better remedy than the emulsion. It is prepared as follows:—

Take 20 lb. of resin, 6 lb. of caustic soda (70 per cent.), 3 pints of whale oil, water to make 80 gallons; place the resin, caustic soda, and fish oil in a large boiler with 20 gallons of water, and boil for 3 hours; then add hot water slowly, and stir well till there are at least 40 gallons of hot solution; then add cold water to make up the total to 80 gallons. Never add cold water when cooking, or the resin will be precipitated, and it will be difficult to get it in solution. The above is the strength to use for citrus trees; a winter wash for deciduous trees may be used one-half stronger, the total amount being made up to 54 gallons instead of 80 gallons.

Four lb. of whale-oil soap can be used in the place of the 3 pints of whale oil, if wished; in which case the caustic soda can be reduced from 6 lb. to 5 lb.

F.

Sulphur, Lime, and Salt Wash.

This is an all-round winter wash for all kinds of deciduous fruit trees, and is an exceedingly effectual remedy for white scale, moss and lichen growths, and the various bark fungi attacking the trunk and main branches of the citrus trees, but is too strong to apply to the foliage unless much diluted. It is both a fungicide and insecticide, being one of the best remedies for the San José Scale and the Mussel Scale of the apple. It is made as follows:—

Take 40 lb. of unslacked lime, 20 lb. of sulphur, 15 lb. of salt, and 50 gallons of water.

To mix, take 10 lb. of lime, 20 lb. of sulphur, and 20 gallons of water; boil for not less than one hour and a-half, or until the sulphur is thoroughly dissolved, in a strong iron not a thin copper boiler; when the mixture will be of a brownish colour. Slack 30 lb. of lime in a barrel with hot water, and when thoroughly slacked, but still boiling, add the 15 lb. salt; when this is dissolved the whole should be added to the lime and sulphur in the boiler, and the whole boiled for half an hour longer, when water, to make the whole up to 50 gallons, should be added. Strain through a wire-sieve, and keep well stirred whilst in use.

As this mixture is very hard on the hands, use gloves when spraying, and have good bamboo extensions fitted to the hose attached to the spray pump. It is also hard on the pump and nozzles, so see that the pump is kept clean, and is never put away without being rinsed out with very hot water.

G.

Whale-oil Soap and Black Leaf Tobacco Extract.

Dissolve ¼-lb. of whale-oil soap in 1 gallon of water, and add 1 to 2 fluid oz. of black leaf tobacco extract. A splendid wash for delicate plants, very efficacious in the case of Apis and Thrips. If not strong enough, double the quantities of soap and extract for Peach Aphis.

H.

White Arsenic and Lime.

White arsenic	1 lb.
Unslacked lime	2 lb.
Water	3 gallons.

Slowly slack the lime, add the arsenic, put in the water, and boil for one hour. Add 160 gallons of water, and it is ready for use. In making this mixture be very careful to boil thoroughly, and if the lime is not of good quality increase the quantity.

I.
SULPHUR.

This is one of the best remedies for the rust mite or Maori of the orange, and for red spider or other spinning mites that attack almonds, apples, plums, &c. It is also the best remedy for oïdium of the grape, pumpkin, melon, &c. The finer the sulphur the better, as the finer it is the more sulphur vapour it gives off, as it is not the sulphur but the sulphur vapour which is of value. Apply when the trees or plants are dry, preferably in the early morning, though many good authorities consider that the best time to sulphur is from 10 a.m. to 4 p.m. instead of the early morning, the sulphur being applied by means of a bellows, or a specially constructed knapsack sulphurer. For Maori the sulphur should be applied when the oranges are about the size of marbles, as it is at this stage that the insects do their damage, though the results are not shown till the fruit ripens.

K.
A PAINT FOR THE TRUNKS AND MAIN BRANCHES.

Boil 2 lb. of sulphur and 1 lb. stone lime in 2 gallons of water for an hour and a-half. Then add 3 lb. more stone lime and boil for half an hour. Make up with boiling water to 2 gallons, and add enough fine flour or fine clay to the mixture to make it of the consistency of thin paint.

L.
AMMONIA CARBONATE OF COPPER.

Dissolve 3 oz. of carbonate of copper in 1 quart of strongest liquid ammonia (sp. gr. ·880), and add 22 gallons of water.

The following tabulated list gives the principal varieties of fruits grown in the State, together with the chief diseases attacking each particular variety, and with suggested remedies for the same. The Black Smut, which covers many fruits and fruit trees, is prevented by destroying the scale insects, aphides, and other sucking insects that exude honey dew, as the smut lives on the excretions of these insects, and is not a disease of the tree :—

Variety of Fruit.	Disease.	Remedy Suggested.
Almond	San José Scale	F in winter, gas treatment in summer
	Red Spider, Mites	F in winter, D in spring. I, when insects hatching out
	Shot Hole Fungus	A
	All insects eating foliage ...	B, H
Apple	Codlin Moth	B, H. Bandaging, destroying infested fruit
	Fruit Fly	Gather and destroy all infested fruit
	San José Scale	F in winter, gas treatment in summer
	Mussel Scale	F ,,
	Parlatoria Scale	F ,,
	Greedy Scale...	F ,,
	All insects eating foliage ..	B, H
	Woolly Aphis	D, G, F in winter. Use nozzles throwing a direct spray with considerable force, so as to get the spray right on to the bodies of the insects. Work over affected trees with non-blighting varieties. Resistant stocks
	Powdery Mildew	A, L
	Black Spot	A, L
	Bitter Rot	A, L
	Bitter Rit	A, L
	Canker	A, F

Variety of Fruit.	Disease.	Remedy Suggested.
Apricot	Shot Hole Fungus	A, L
	Gum	Cut away diseased part till clean bark is found, and paint wound with K
	Fruit Fly	Gather and destroy all infested fruit
	All insects eating foliage ...	B, H
Banana	Fruit Fly	Gather and destroy all infested fruit. Cover bunches with cheap netting
	Banana Disease	Thorough drainage and systematic manuring, especially with green manures
	Nematodes on roots... ...	Dig up and burn
	Borers in stems and roots ...	Dig up and burn
	Gum in fruit	Try making a cut lengthwise in stalk of bunch 1 month before cutting
Cherry	Pear Slug	B, H
	Shot Hole Fungus	A, L
	Gum	The use of suitable stocks. Drainage. Cut out clean and paint wound with K
	Fruit Fly	Gather and destroy all infested fruits
	All insects eating foliage	B, H
Citrus Fruits ...	Scale insects of various kinds	C and E. Gas treatment, F, K, for main stems
	All insects eating foliage ...	B, H
	Aphis	D, G
	All sucking bugs	C when young, hand gathering, driving to centre of tree and destroying
	Borers	B, destroying mature insects. Injecting kerosene into and plugging up hole
	Sucking Moths	Use trap lanterns. Hand gathering. Hanging up ripe fruit in trees to attract moths
	Fruit Fly	Gather and destroy all infested fruit
	Peach Moth	Gather and destroy infested fruit
	Maori	I
	Melanose	A, L
	Black Brand	A, L
	Bark Fungi, and all moss and lichen growths	A, F, K
	Gum, Bark Rot, Root Rot	Cut out clean and cover wound with K. Good drainage
Custard Apple ...	Scale insects of various kinds	C and E. Gas treatment
	Peach Moth	Gather and destroy infested fruit
Fig	Scale Insects of various kinds	F, K, C
	Fig Beetle and all other insects eating foliage	B, H
Guava	Scale Insects of various kinds	Cut out and burn all worthless trees, and look well after any that are kept
	Fruit Fly	Gather and destroy all fly infested fruit
Mango	Scale Insects of various kinds	C, E. Gas treatment
	Fruit Fly	Gather and destroy all infested fruit
	Leaf Burn	A in early spring. L
	Beetles on flowers	B, H
Olives	Scale Insects...	C. Gas treatment
	Thrips...	D, G
Peach and Nectarine	San Josè and other Scale Insects	F in winter, gas treatment in summer
	Peach Moth	Thin out fruit, gather and destroy infested fruit
	Fruit Fly...	Gather and destroy infested fruit
	Peach Aphis	G
	Curl Leaf	A early in spring
	Peach Freckle	A, L
	Mites and Red Spider ...	I
	Gum	Cut out clean and cover wound with K
	Canker, moss, lichens ...	A, F
Pear	San José and other Scale Insects	F in winter, gas treatment in summer
	Pear Slug	B, H
	Pear Mite	D
	Fruit Fly	Gather and destroy all infested fruit
	Codlin Moth	B H, bandaging. Destroy all infested fruit
	Black Spot	A
	Canker, moss, lichens ...	A, F
	All insects eating foliage ...	B, H

Variety of Fruit.	Disease.	Remedy Suggested.
Persimmon ...	Scale insects of kinds ...	F, C. Gas treatment
	Canker, moss, and lichen ...	A, F
	Fruit Fly	Gather and destroy all infested fruit
Pineapple ...	Pineapple disease	Only plant on well-drained land
	Cripples	Never plant a sucker from a plant that has produced a cripple
	Tangleroot	Strip off lower leaves before planting, so as to allow roots to start properly
Plum	San José and other Scales	F in winter, gas in summer
	Red Spider and Mites ...	F, I
	Fruit Fly	Gather and destroy all infested fruit
	All insects eating foliage ...	B, H
	Shot Hole Fungus	A
	Gum	Cut out clean and cover wound with K
Quince	Canker, moss, and lichen ...	A, F
	Fruit Fly and Codlin Moth	Gather and destroy all infested fruit
	Moss, lichens, and canker...	A, F
	Scale Insects...	F in winter, gas in summer
Strawberry ...	Leaf Blight	Cut off and burn all infested leaves. Spray with A, L
	Mildew	A before the blossoms appear; spray with sulphide of potash ¼-oz. to gallon at any time
Other fruit trees	Scale Insects...	C, D, F, K, or gas treatment
	All leaf-eating insects ...	B, H
	Moss, lichens, canker ...	A, F
	Fungus diseases	A, L

GAS TREATMENT FOR SCALE INSECTS.

Although of comparatively recent introduction (1886), this method of destroying scale insects, particularly those attacking citrus trees, is now considered to be the most effectual remedy known. In the extensive orange orchards of California it has practically taken the place of spraying for the destruction of the Red Scale of the orange (*Aspidiotus Aurantii*), the Purple or Mussel Scale (*Mytilaspis citricola* or *M. fulva*), and all other armoured scales. There has recently been a great discussion in the fruit Press of California respecting the merits of the gas treatment and what is known as distillate spray, the result of which has been to bring gas treatment into even more common use, as it is recognised as the best all-round method of destroying scale insects. It is also largely used in Cape Colony for the destruction of scale insects, and Mr. Charles P. Lounsbury, the Government Entomologist, states that it is the cheapest and most effectual remedy for the Red Scale of the orange.

In this State the use of hydrocyanic acid has rapidly come to the front, especially in the treatment of scale insects on citrus trees, and, though the first experiments were only begun some seven years ago (in December, 1896), it is now in common use throughout many parts of the State, and is giving general satisfaction.

The reason for this is that it destroys all the scale insects that attack our fruit trees, as, once a gastight tent is placed over the tree, and a sufficient quantity of hydrocyanic acid gas is generated, there is no escape for any scale insects, whereas in spraying, no matter how carefully and thoroughly it is carried out, there is always a chance of one or more parts of the tree being missed. The consequence is that the effects of cyaniding are more lasting, and, once the initial expense of the outfit is overcome, it is the cheapest method of treating scale insects.

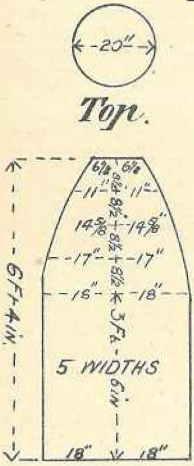
Since this method of destroying scale insects has been in vogue in this State we have gained a considerable amount of practical experience, so I find I have to modify somewhat what I wrote in 1899, particularly as regards the doses to be used. I then took as a basis 1 oz. of cyanide of potassium to each 300 cubic feet of space enclosed by the tent or sheet, and, although I find this

Sketches of Bell Tents N^os 0,1,2&3

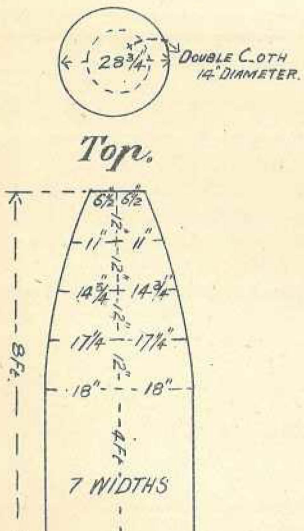
Showing dimension for cutting Widths and Tops. 1 inch is the width allowed for all seams. All measurements are given in feet and inches.

— NOTE —

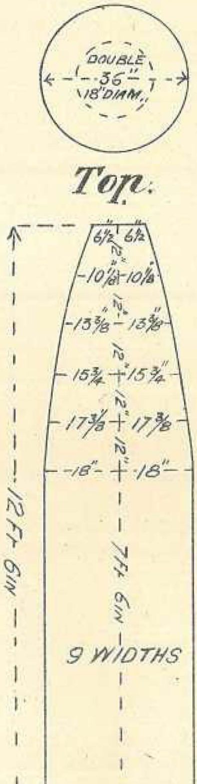
N° 0. Covers trees 4½ ft. diameter by 5 ft. high. N° 1. covers trees 6½ ft. diam. by 7 ft. high N° 2. covers trees 8 ft. diam. by 11 ft. high. N° 3 covers trees 10½ ft diam. by 12 ft. high.



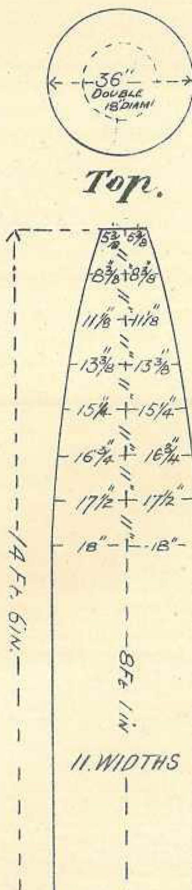
N° 0.



N° 1.



N° 2.



N° 3.

Scale ¼ in. to 1 ft

quantity sufficient for large trees requiring 7 oz. and above, it is not sufficient for the smaller trees, the proportion of loss of gas as compared to the cubic contents enclosed being much greater in the case of the smaller sizes of trees; hence it has been found necessary to increase the dose for such trees. The method of applying the gas is to envelop the tree to be treated with a gas-tight covering. These coverings are made in two shapes—viz., bell tents and octagonal sheets—the method of making which I described in the *Agricultural Journal* for July, 1900, and reproduce herewith.

A number of inquiries having been received by this Department as to the material required and method of making bell tents and sheets for cyaniding fruit trees, the following information, together with the accompanying illustrations, showing the method of cutting the cloth, will, I trust, prove of value to fuitgrowers:—

In the first place, as to material, we have tried many different kinds, with the result that we are now using nothing but the very best quality of duck: the particular brand that we have found most satisfactory being marked "Heavy Cotton Duck Canada D," in an oval.

We are also using what is known as the Willesden rot-proof canvas, which is a first-class quality 16-oz. duck, treated with a copper solution in order to render it more lasting, and to prevent its becoming mildewed. This material is giving very satisfactory results, being more gastight than any undressed duck. We are also testing a finely woven but much lighter texture of duck, which, so far, promises to be very suitable, but, before recommending same for large sheets, we purpose testing it thoroughly. (Three years' experience has shown that the lighter duck answers well, particularly when finely woven. Duck 72 inches wide and weighing from 10 to 12 oz. to the square yard is giving good satisfaction and wearing all right.)

No first-class duck requires to be treated with oil, or other similar substance, to render it gastight, as it is sufficiently gastight for all practical purposes without any such treatment. At the same time it is advisable to tan both bell tents and sheets by placing them in a strong tan bath, the tanning material used being either wattle-bark, ironbark, divi-divi, or other suitable tanning material.

The object of this tanning is to prevent the tents or sheets from rotting, or from being covered from mildew. Good quality calico can also be used for small bell tents or small sheets to be used in the place of bell tents. It is not as lasting as duck, but, if kept well tanned and taken care of, will stand light work all right. In the Departmental outfit we are at present using five sizes of bell tents, but, as we have found by experience that the largest size now in use is unwieldy, we shall make no more of this size, but stick to the four sizes, particulars of which are given below, and the method of cutting the cloth for which is given in the accompanying illustration. The illustration, which explains itself, is reproduced from drawings and calculations that have been made by Mr. J. Henderson, late manager of the Redland Bay Experiment Orchard, who had charge of the cyaniding outfit for several months:—

No. 0 *Bell Tent* is made of five widths of 36-inch duck, 6 feet 4 inches long, and will treat trees up to 4½ feet in diameter by 5 feet in height.

No. 1 *Bell Tent* is made of seven widths of 36-inch duck, 8 feet long, and will treat trees up to 6½ feet in diameter by 7 feet in height.

No. 2 *Bell Tent* is made of nine widths of 36-inch duck, 12 feet 6 inches long, and will cover trees up to 8 feet in diameter by 11 feet in height.

No. 3 *Bell Tent* is made of eleven widths of 36-inch duck, 14 feet 6 inches long, and will cover trees up to 10½ feet in diameter by 12 feet in height.

Even larger trees than those given can be covered by the various sizes of tents by tying in straggling growths, and thus bringing them within the measurements given. In order to cut out the duck so as to get the dome of the tent exact, cut off a length of duck according to the size of the tent you desire to make, and fasten it securely to a floor. Run a chalk line the whole length of the cloth from centre to centre, and set off cross lines at right angles to this centre line with a square, at the distances given in the plan. Mark off on these cross lines the distances as per plan, and connect same with a curved line, which is the line on which the cloth is cut. Having cut out one width, it is an easy matter to cut out as many as may be required.

All the sewing can be done by machine, using a strong linen thread (No 26), and making about ten stitches to the inch. All seams have a lap of an inch, and are sewn with two—or better still—three rows of stitches. As shown in the plan, the top of the tent (the cap) is circular, and the method of sewing adopted is as follows:—"First sew three or four widths together, then sew the top on to them; then add three or four more widths and complete sewing the top to them, and so on, till you arrive at the last seam; then complete sewing on the top. When this is done, you start the last seam at the top, and complete the three rows of stitching for a yard or so down, or as much as the machine can take, and continue sewing in short laps until complete."

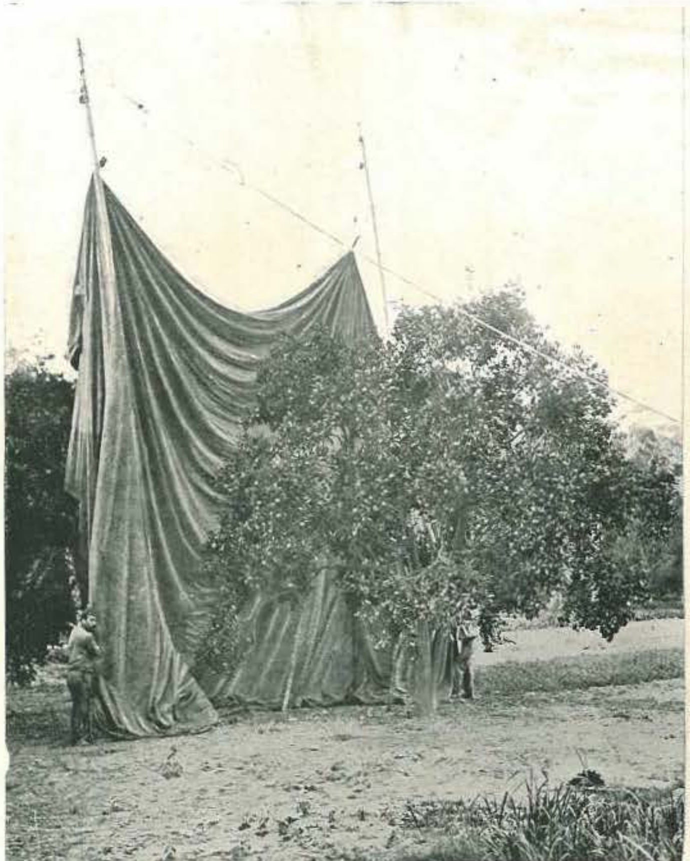
The above method of making the tent is that adopted by Mr. Henderson, and experience has proved it to be satisfactory. In tents Nos. 1, 2, and 3, an extra circle of duck is sewn on the apex of the tent, and to which is attached a ring of 1½-inch rope, about 5 inches in diameter, with which the tent is placed on and taken off the tree to be treated. In tents No. 2 and No. 3, four hobble rings are sewn on to the bottom edge of the tent, equidistant from each other, with which to put the tents over the trees, as the rings of gaspiping used in our first tents have been done away with, and this method of placing the tents over the trees substituted for it. In addition to bell tents, we use three sizes of sheets which are approximately 40, 50, and 56 feet in diameter respectively. A 40-foot sheet will cover trees about 15 feet in diameter by 15 feet in height; a 50-foot sheet, trees about 20 feet in diameter by 20 feet high; and a 56-foot sheet, trees about 20 feet in diameter by 24 feet in height. Larger trees require two or more sheets, as sheets above 56 feet in diameter, if made of heavy duck, are too heavy and cumbersome to be worked satisfactorily. (Since writing the above a sheet 60 feet in diameter has been purchased by a Buderim Mountain fruit-grower, and no difficulty is experienced in handling it.)

All sheets are octagonal in shape, each side being of equal length.

A 40-foot sheet is made of fourteen widths of 36-inch duck, of which six widths are cut 41 feet 3 inches long, which, after allowing for a lap of 2 inches at each end to prevent fraying out, gives a diameter the long way of the cloth of 40 feet 11 inches. This is equal to the diameter across the widths of the cloth, as fourteen widths give 42 feet less 13 inches for seams, or a width of 40 feet 11 inches in all.

On each side of the six widths going the whole diameter of the sheet are four widths, which, instead of being cut off square, are cut at an angle of 45 degrees, as this angle will produce a regular octagon. In order to get an angle of 45 degrees, mark off one yard of cloth, and draw a line from corner to corner diagonally across it, and you will get what you require. There is no waste in this method of cutting out, every particle of duck being used.

A 50-foot sheet is made of seventeen widths of 36-inch duck, of which seven widths are cut 50 feet long, which, after allowing 4 inches for the ends, gives a diameter the long way of 49 feet 8 inches, the same as that obtained by the seventeen widths, or 51 feet less 16 inches for seams. There are five widths



Sheet Raised Ready to be Thrown Over a Tree.

A Tree being Covered for Cyaniding.

on either side of the seven through widths, and they are cut in the same manner as that described for the 40-foot tent. A 56-foot tent is made the same way as a 50-foot, with the exception that a 3-foot width of duck is sewn on all round it. These measurements do not give absolutely correct octagons, but they are near enough for all practical purposes. Where 72-inch duck is used in the place of 36-inch, of course there is only half the number of widths. The cutting of the angles is similar to the 36-inch duck—only two yards are marked off instead of one yard.

Bell tents and small sheets are easily handled, and there is little, if any, difficulty in placing them over the trees to be treated. Care must, however, be taken to see that there is no escape of gas at or near the ground, so that it is advisable to place a little fine earth on the edges of the tent so as to keep it in position and to prevent loss. The method of using the large sheets is well shown in the following illustrations :—

The following tackle is required for raising the sheets :—Two uprights for placing, one on each side of the tree, made as follows :—The poles are 30 feet in length, and can be made of any suitable material, a piece of straight-grained Oregon pine, 4 inches by 2 inches, free from knots, being probably the best timber to use. Flooded gum saplings barked and well dried also make good poles. The poles are attached to bottom plates 6 feet in length, 6 inches by 2 inches, and stayed to same by 3-inch by 2-inch braces 5 feet long, which are firmly bolted to the base and to the pole. Instead of using pine, the Department use strong bamboos, which are attached to a base and stayed to it by ⅝-inch round iron attached to a clamp on pole. The bamboos are strong, light to handle, and answer well if straightened when first cut. In selecting bamboo poles, care must be taken to see that they are mature, as, if not, they are not strong enough to stand the strain of raising the largest sheets. A guy rope of 2 inches circumference, about 50 feet long, is attached to the top of each upright, and the sheet is raised by means of a fixed pulley attached to the top of the upright, and by a movable pulley which is attached to the sheet; the two pulleys being connected by 100 feet of rope of 1½-inch circumference. The movable block is attached to the sheet by means of a movable tie which is placed on the sheet at 6 or 8 feet from its hedge, this being found a better plan than attaching the pulley to fixed rings on the edge of sheet, as the latter is easier raised, and, when thrown over the tree, the lap falls into its right position.

To raise the sheet, which should be laid out at the back of the tree ready for raising, the uprights are raised, each by two men—one at the base of the pole hauling on the block rope, and the other at the pole itself. When upright, the man who has raised the pole takes the guy rope and holds the uprights in position—viz., slightly leaning from him. The two men at the block ropes then raise the sheet, and, when high enough, the other two men at the guy ropes pull steadily, and thus draw the sheet slowly over the tree, the uprights falling with the sheet. A little earth is now placed round the edges of the sheet, and the tree is ready for treatment.

Instead of using two poles, as shown in the illustration, a single pole may be used, the method of using it being as follows:—Place the sheet on one side of the tree to be treated, ready for hauling up. Next raise the pole on the opposite side of the tree to the sheet, and let it lean well over the tree, the guy rope keeping it from falling into the tree. Next attach the single block to a sling made fast to a corner of the sheet and raise the sheet slowly, pulling on the guy rope whilst doing so till the pole is quite upright or even leaning slightly from the tree, so that when the block rope is let go the sheet will fall over and cover the tree, the pole being let gently on to the ground. When taking the sheet off one tree to place on another it has first to be taken from the one tree on to the ground, and pulled thence as described on to the adjacent tree. Though much slower than when using two poles, three men can do the work easily instead of taking four, and if a little extra care and time are taken two men can do the work, a consideration when labour is not too plentiful.

The charging of the tents or sheets—viz., the generation of the gas—is done as follows:—First determine the dose required by the tree, as shown by the table attached to the end of this article. For example, say that the tree is 15 feet in diameter by 15 feet high, the table shows that its capacity is 2,210 cubic feet, and that the dose for this size is 7½ oz. of cyanide of potassium, 7½ oz. fluid of commercial sulphuric acid, and 23 oz. fluid of water. First place the 23 oz. fluid of water in an earthenware dish (a pudding-basin answers very well); then add the sulphuric acid to the water, taking care to pour it on slowly and not to splash, as the acid will burn holes in the clothes or injure the face, arms, or hands of the operator if not carefully used. The basin containing the acid and water is next placed under the sheet or tent, as far from the canvas as possible. The cyanide after being broken into pieces of about ¼ to ½ oz. each in weight is then added, and a small piece of sacking is placed over the basin to prevent spurting. The operator takes especial care not to breathe whilst under the tent, after having added the cyanide to the acid and water, and gets out as quickly as possible, the bottom of the sheet or tent being made airtight as soon as he has got out. The gas is generated very rapidly, and is a deadly poison, all scale or other insects breathing it being killed. The trees remain covered for 45 minutes, when the sheets or tents are removed to other trees. On a quiet night, especially when using large doses, it is advisable to take care when raising the sheets and tents to let the gas diffuse for a short time before going too near the trees, as although there is comparatively little danger in breathing the gas when well mixed with air, yet if too much is inhaled it is apt to cause a severe headache.

The treatment of the trees is best carried out at night, though dull cloudy days are equally well. Bright sunny days or windy days are not suitable. Leaves and fruit must always be dry, and a heavy dew at night stops work. I have used this method of treatment at all stages of growth, and find that as long as the tree is dry and does not contain an excess of young tender growth the gas does little injury to either flowers, young, or matured fruit. Probably the best time is after the spring growth and before the summer growth takes place, as then most of the mature scales have hatched their young, and these are easily killed, so that the fruit, if cleaned at this time, will keep clean till marketed, and the energies of the tree will be devoted to maturing its crop of fruit instead of supplying nourishment to countless sucking insects. Growers using this method of treatment soon get to know how much they can use without injuring the foliage or fruit. As this depends largely on the state of growth the tree is in at the time of treatment, a dose that would destroy young sappy leaves and tender shoots has little, if any, effect on well-matured leaves and wood. The general rule is to use enough cyanide to just touch the young growth, as if this is done few, if any, scale insects will be left alive.

Great care has to be taken to prevent the acid from spurting or splashing on to the sheets or tents, as it destroys the material at once. All damage done in this manner should be cut away and the hole neatly patched. Care is also required not to pack the sheets away when damp, and to keep all poles, blocks, and tackle in good order. The cyanide of potassium, being a deadly poison, should always be kept under lock and key, and the sulphuric acid should always be handled with great care. When handling the cyanide, keep the finger-nails cut short so as to prevent the poison from accumulating beneath them, and wash the hands carefully before eating, as the poison is so deadly (under 3 grains being a fatal dose) that every possible precaution should be taken to prevent even the smallest particle getting on to the food.

Cyanide of potassium should also be of 98 per cent. purity; and cyanide of soda, which we have been testing recently with equally good results, should be of the highest grade. The sulphuric acid used is the ordinary commercial acid.

The following is the amended table showing the quantities of cyanide, sulphuric acid, and water to use for trees of the following sizes, together with the space enclosed in cubic feet:—

Diameter.	Height	Capacity.	Cyanide.	S. Acid.	Water.	Diameter.	Height.	Capacity.	Cyanide.	S. Acid.	Water.
Feet.	Feet.	C. Ft.	Oz.	Oz. fl.	Oz. fl.	Feet.	Feet.	C. Ft.	Oz.	Oz. fl.	Oz. fl.
3	4	25	¼	¼	¾	15	15	2,210	7½	7½	23
4	4	42				15	16	2,380	8	8	24
4	5	55	½	½	1½	15	17	2,560	8½	8½	26
5	5	82				15	18	2,740	9¼	9¼	28
5	6	100	¾	¾	2	15	19	2,910	9¾	9¾	30
5	7	120				15	20	3,090	10½	10½	31
6	6	140	1	1	3	16	13	2,080	7	7	21
6	7	170				16	14	2,280	7¾	7¾	23
6	8	200				16	15	2,480	8¼	8¼	25
7	7	225	1½	1½	4½	16	16	2,680	9	9	27
7	8	260				16	17	2,880	9¾	9¾	29
7	9	300	2	2	6	16	18	3,080	10¼	10¼	31
8	8	340				16	19	3,280	11	11	33
8	9	390				16	20	3,480	11¾	11¾	35
8	10	440	2½	2½	7½	16	21	3,680	12¼	12¼	37
9	8	410				16	22	3,890	13	13	39
9	9	480				17	13	2,257	7½	7½	23
10	8	500				17	14	2,480	8¼	8¼	25
9	10	540	3	3	9	17	15	2,710	9	9	27
10	9	570				17	16	2,940	9¾	9¾	30
11	8	586				17	17	3,165	10½	10½	32
9	11	600				17	18	3,390	11½	11½	35
10	10	650				17	19	3,620	12	12	36
12	8	678	3¼	3¼	10	17	20	3,850	13	13	39
11	9	680				17	21	4,070	13½	13½	41
10	11	730				17	22	4,300	14½	14½	44
11	10	770				18	12	2,300	7¾	7¾	24
13	8	770				18	13	2,540	8½	8½	26
12	9	790	3½	3½	11	18	14	2,800	9½	9½	29
10	12	810				18	15	3,050	10¼	10¼	31
13	9	850				18	16	3,300	11	11	33
11	11	870				18	17	3,560	12	12	36
14	8	870	3¾	3¾	12	18	18	3,810	12¾	12½	39
12	10	900				18	19	4,070	13½	13¾	41
13	10	940				18	20	4,320	14½	14½	44
11	12	960				18	21	4,580	15¼	15¼	47
15	8	970				18	22	4,830	16	16	48
12	11	1,020	4	4	12	18	23	5,080	17	17	51
14	9	1,030				18	24	5,340	18	18	54
11	13	1,060				19	13	2,790	9¼	9¼	28
13	11	1,070				19	14	3,070	10¼	10¼	31
12	12	1,130				19	15	3,360	11	11¼	34
15	9	1,150				19	16	3,640	12	12	36
11	14	1,160	4½	4½	13½	19	17	3,935	13	13	39
14	10	1,180				19	18	4,220	14	14	42
12	13	1,200				19	19	4,500	15	15	45
13	12	1,240				19	20	4,790	16	16	48
15	10	1,330				19	21	5,070	17	17	51
14	11	1,330	5	5	15	19	22	5,355	18	18	54
13	13	1,340				19	23	5,540	18½	18½	56
12	14	1,357				19	24	5,820	19½	19½	59
12	15	1,470				20	13	3,040	10	10	30
13	14	1,470				20	14	3,350	11¼	11¼	34
16	10	1,470	5½	5½	16½	20	15	3,660	12¼	12¼	37
14	12	1,490				20	16	3,980	13¼	13¼	40
15	11	1,500				20	17	4,290	14¼	14¼	43
13	15	1,600				20	18	4,500	15	15	45
14	13	1,640	6	6	18	20	19	4,820	15	16	48
16	11	1,670				20	20	5,135	17	17	51
15	12	1,680				20	21	5,450	18	18	54
14	14	1,790				20	22	5,760	19¼	19¼	58
15	13	1,850	6½	6½	20½	20	23	6,070	20¼	20¼	61
16	12	1,880				20	24	6,390	21¼	21¼	64
14	15	1,950									
15	14	2,030	7	7	21						
17	12	2,030									
14	16	2,100									

THE GRAFTING OF MANGOES.

Mr. H. Burkitt, Corinda, writes:—

The result of an amateur attempt at mango-grafting near Brisbane may be interesting to your readers. My most vigorously growing mango-tree bore fruit of such inferior quality that I was about to destroy it, when my friend Mr. D. O'Connor—to whom, by the way, Queensland is more indebted than she at present realises—suggested trying to engraft a good variety on it after the manner described by Mr. Knight in your *Journal* of July, 1900.

Early last March I accordingly acted on his suggestion with two grafts. These were followed in April by eight grafts taken from faggots received from Cooktown. The latter failed, but in July one of the March grafts sent out a healthy shoot from its centre. When it was about 2 inches long, I cut away the wood above it, thinking to conserve the sap; but this deprived the shoot of its shelter, and its young leaves were shrivelled by the cold. A screen was placed above and on the west side, and now the growth is about 3 inches long, with a crown of healthy leaves.

Recently, seeing that luxurious growth is in progress, I have experimented with two more grafts. For one I made three cuts in the stock thus and inserted the scion under the two flaps. In the other case I used a wad-punch to cut both stock and scion, but fear the thickness of the metal bruised the outer bark.

From what I hear, Mr. Knight's process has been tried near Brisbane, and failed hitherto, owing, it was said, to the unsuitability of the climate.

SOUTH AUSTRALIAN VINTAGE OF 1903.

The official figures for this year's South Australian vintage show that the quantity of wine made was 2,573,422 gallons. Although this is smaller than that of the record vintage of 1901, when 2,813,301 gallons were produced, the figures are satisfactory, and above the most sanguine estimates formed some months ago. A pleasing feature of the wine industry is that the quantity made at each of the last three vintages has totalled over 2,000,000 gallons. The return this year is greater than that of 1902, and occupies second position to the record vintage. The following figures show the quantities of wine that have been made during the past eight vintages, and from them a fair idea of the expansion of the industry can be obtained:—

	Gallons.		Gallons.
1896	1,743,090	1900	1,558,285
1897	1,898,105	1901	2,813,301
1898	1,263,998	1902	2,431,563
1899	1,342,960	1903	2,573,422

The wine in stock at the end of each vintage for the past three years was as follows:—

	Gallons.
1901	4,915,636
1902	5,027,754
1903	5,535,694

The increased quantity in stock after the conclusion of this year's vintage was thus 507,940 gallons, notwithstanding that only 141,859 gallons more wine was made in 1903, as compared with the previous year. This shows that the stocks in the hands of the winemakers are gradually increasing, and some vignerons appear rather concerned over the prospects of the trade in wine between South Australia and England in the near future. However, the chances of increased business with the other States of the Commonwealth are exceedingly good. Generally, the improved methods of manufacture that became a marked feature of the industry some years back are still pursued, and winemakers are well maintaining their reputation as producers of a first-class article.—*Journal of Agriculture*, S.A.

BLACK SPOT.

Mr. J. Hamilton, a leading fruitgrower of Victoria, gives to the *Australian Culturist* the results of an experiment with a new spray on apple-trees to destroy the black spot.

This grower has ben experimenting for the past three years to find a cure for this fungus disease; but two seasons ago he tried a mixture of his own manufacture, which he applied to one Rokewood, either to kill or cure. Mr. Hamilton says it was a comparative success, as that tree carried ten clean and one spotted apples, against forty-nine similar trees not bearing eighteen apples (clean) all told. This season he sprayed again, and did not come across one spotted apple in 100 cases. Mr. Hamilton very kindly enclosed his formula, trusting it will be of benefit to the apple-growing community generally:—

The Formula.

4 lb. bluestone, 2 lb. alum, 3 lb. lime, 30 gallons of water.

The following are the directions for use:—

1. Dissolve the bluestone in 8 gallons of water, and put same in spray barrel.
2. Dissolve the alum in 7 gallons of water, and add same to bluestone, after which mix well.
3. Dissolve in a separate vessel, containing 15 gallons of water (cold), 3 lb. quicklime, which must be the best, and free from stones.
4. When ready to spray, not before, mix the lime solution with the contents of the barrel, and spray at once.

It is not necessary to say that all should pass through a sieve, as it saves trouble when spraying. The action of lime, in combination with alum, forms ammonia, which, in combination with bluestone, is destructive to black spot.

That is the result of Mr. Hamilton's experiments in connection with black spot, which he hopes will be as beneficial to other fruitgrowers as it has been to himself. In conclusion, let me remind readers of a proverb I saw in the pages of this journal, and they will not be far out if they practise it. It is that "Science Wins."

INSECT AND FUNGOID PESTS.

(From the *Journal of Agriculture* of Western Australia.)

Treatment and Remedies.

Until of late years little or no attention was paid to the damage caused by insect and fungoid pests to cultivated crops.

In the old days of farming and fruitgrowing pests were regarded in the light of an unavoidable calamity and a visitation of Providence; their nature was shrouded in mystery, or they were either entirely unknown in some parts of the world, or else were often met with, under a mild form, in certain localities; a great many, by transplantation to surroundings somewhat dissimilar to those by which they were influenced in their original *habitat*, have subsequently developed more pronounced and distinct characteristics, and have consequently forced themselves to the notice of cultivators.

These so-called new pests, either insects or fungi, are as ancient as the world, and although they are greatly influenced by their immediate surroundings, by the food at their disposal, the climate in which they live, by the enemies they have to contend with, and by many other circumstances of various nature, they nevertheless spring from parent individuals in every respect like themselves. The devastating phylloxera, for instance, or the woolly aphis of our days did not originate as spontaneously from the roots of the vine or of the apple-tree, but are the descendants, in a direct line, of a long list of ancestry of lice of these respective tribes. In a similar manner, the rust of cereals or the oïdium of the vine has no more budded from the wheat plant or the grape vine than potatoes are transformations of the soil, but have simply grown from seedlike germs produced by preceding pests of the same kind.

Every season, almost, we hear of the appearance of new pests, and it is more than likely that, for a great number of years to come, the list, already formidable, of the sorts of insects and fungi that invade and prey on our crops will gradually be made longer still, by the addition of more unwelcome enemies.

Various factors combine to bring about this undesirable state of things.

In the first instance, we have seen that new conditions of life may develop propensities of a distinctive nature; or, again, the partial extermination of some parasites of these pests, either owing to unfavourable surroundings or the use of insecticides, by breaking the balance of nature, may insure the preponderance, to an alarming degree, of certain species of pests. By the constant and more rapid interchange, on the other hand, of plants, fruits, seeds, and cuttings of all sorts of ornamental, economic, or useful plants from all parts of the world, many of the parasites of plants have been widely disseminated, without, in a great many instances, their own particular parasites having been brought with them; and thus the appearance of hitherto unknown pests is accounted for in countries until then free from them.

For, as it is so concisely expressed in Dean Swift's oft-quoted couplet—

> The little fleas that do us tease
> Have other fleas that bite 'em;
> And these, in turn, have other fleas,
> And so on *ad infinitum*.

To ward against the importation of noxious pests, the Government of Western Australia, profiting by the errors and experience of older fruit-growing countries, have passed a Fruit Pest Act, reproduced, as an appendix, in the "Handbook of Horticulture and Viticulture," and which provides for the disinfection, on landing, of plants and fruits, for the purpose of checking any possible importation from abroad of pests inimical to fruit trees and vines.

Amateur gardeners, as well as professionals, who concern themselves about the well-being of their plants, have continuously to contend with two classes of pests which injure their crop. The first of these are *noxious insects;* the second, *parisitic fungi.*

Insects vary greatly in their shape, size, and colour, but on broad lines they all pos-ess, when seen in their full-grown stage, certain features which differentiate them from other animals. They possess three pairs of legs, attached to a body divided into three definite portions—a head, a thorax, and an abdomen.

Some of them—indeed, the majority—undergo during their development well-marked transformation or stages: 1st, the egg; 2nd, the larvæ or caterpillar; 3rd, the pupa or chrysalis; 4th, the adult or imago stage. Moths and butterflies, amongst others, belong to this class. In two or, may be, three periods of their transformation they take no food, and are fixtures; during these periods they do no actual harm. Thus, butterflies and moths are inert in the egg as well as the pupa stages; and some of them, such as the codlin moth for instance, do not feed. Yet it is during these periods of rest and transformation that it is often easier to attack them. These insects undergo what is called *complete transformation*, in contradistinction of others which undergo *incomplete transformation*. This second class, such as grasshoppers and locusts, have eggs which, in hatching, give forth young insects which only differ from the full-grown ones in size and in possessing no wings. Instead of changing from larva to pupa, they proceed, by a series of moulting or casting off their skin, to the mature stage, and become imago. During these successive moultings they are known as "nymphs."

Again, some insects lay eggs, and are "oviparous"; while others bring forth their young alive, and are "viviparous." The majority of them, however, proceed from the egg, whether that egg is deposited and cemented to the plant by means of a viscous secretion or whether they give birth to young ones. In the latter case the female insect generally carries the egg internally until the hatching period arrives.

So much for the life history of insects, considered broadly. A number of varieties depart from the pattern laid down in several minor details which cannot be touch ed upon in this paper, although a clear understanding of these particularities is of great assistance in combating pests. They often constitute the weak point of the armour it is meant to penetrate, and serve as a guide in directing the attack against them.

Almost as important as an understanding of the life history of pests is a knowledge of the manner they attack plants when taking their food.

In that respect noxious pests may be considered, irrespective of their classification, names, shape, or colour, into two general types: ***biting and chewing insects*** and ***sap-sucking insects***. The former are often leaf-eaters or bark-nibblers, or, again, wood and fruit borers. They are provided with jaws by which they can gnaw the surface of the food plant, and chew it.

The latter feed on the juices of the inner tissues of the host-plant. They are armed with a pointed tube-like beak, which they thrust into the tissues of their host-plant, and suck out the sap.

Of the biting or food-chewing insects, some are:—

(1) Root-eaters; such as the white worm of the cockchafer, the larvæ of the cicadæ.

(2) Others, bark-nibblers; as certain kinds of beetles and of weevils.

(3) Some are leaf-eaters; as slugs, caterpillars, saw-flies' larvæ, the carpenter bee.

(4) Others injure the bud, the blossom, or the fruit; as the strawberry weevil, the codlin moth.

Of the sucking insects, in a like manner, some are:—

(1) Root-sucking insects; as the woolly aphis and phylloxera of the vine.

(2) Others, ordinary bark-sucking insects; as the mealy bugs.

(3) Some leaf and bud or fruit sucking insects; as the rose and the orange aphis, the red and other scales, and plant bugs.

When fighting against biting insects, their food plant is best coated with substances which will act as internal poisons; whereas, when directing the attack against sap-sucking insects, the treatment must be such as hurts and kills by direct contact; they are external irritants, and act from the outside, either closing the breathing pores or killing by irritation of the skin.

To the first category belong the various combinations of arsenic, and chief amongst them "Paris green," a chemical combination of arsenic and copper. When unadulterated it contains 55 to 60 per cent. of arsenic. It is almost insoluble in water. It is applied either—1st, dry in a state of impalpable powder, mixed in the proportion of 1 oz. of Paris green with 2 lb. flour, slaked lime, road-dust, or ashes; 2nd, or in a liquid mixture in the proportion of 1 oz. in 10 gallons of water. It should not be used in conjunction with any acid substance which would dissolve the arsenic it contains and make it caustic, but, on the contrary, it is always a good plan to add to it a handful of lime, which has the property of turning insoluble any trace of caustic arsenic it contains. Being a heavy substance, it quickly settles to the bottom of the pumping tackle, and requires agitating.

Other combinations of arsenic, such as London purple and arsenic and soda solution, are also used, but genuine and unadulterated Paris green is the best. A little glue or flour paste may be added to cause it to adhere better, especially to plants with glossy leaves.

Hellebore, unlike the arsenites, which are mineral poisons, is a vegetable poison, and is less dangerous. It is a powder made of the roots of the white hellebore, and kills both by contact and by being eaten. Very effective when fresh, it loses its strength by standing. In doses 1 oz. to 3 gallons of water it is much used against the pear slug and leaf-eating worms.

Pyrethrum, or insectibane, is also a poison, and is effective when fresh, but loses strength when exposed to the air. It is made from the powdered flowers of plants of the genus *Pyrethrum*. That light-brown powder is dusted over the plants or sprayed, in the proportion of pyrethrum 1 tablespoonful, boiling water 2 gallons. It kills by contact, and should be applied as long as the insects persist. Burnt over hot coals in the conservatories and greenhouses, it rids plants of aphis and other insect pests. Pyrethrum are easily cultivated, make pretty borders, and a supply of fresh flowers could, without trouble, be raised in every garden.

Kerosene, in the form of an emulsion with soapsuds, or mechanically mixed with water in the form of a misty spray, in the proportion of 1 of kerosene and 4 of water, will kill nearly all insects, and not injure the foliage.

Resin Compound is known to be very effective against scale insects. One of the best formulas is: Caustic soda, 1 lb.; resin, 5 lb.; water, 25 gallons. Two ounces of Paris green may be added to this when used.

Sal Ammoniac (chloride of ammonia), at the rate of $\frac{3}{4}$ to 1 oz. per gallon of water, is a cheap and efficacious spray against red scale.

Tobacco is one of the safest and most valuable insecticides, and may be applied in several ways, either as a fine dry powder against slugs and aphis, or as a decoction of 3 to 4 gallons of water to 1 lb. of tobacco, or in fumes when burnt in the greenhouse.

Carbolic Acid, especially in its crude state, is a valuable insecticide as an emulsion made by mixing 1 quart soft soap, or about 1 lb. of hard soap dissolved in 2 gallons of boiling water, and then adding 1 lb. crude carbolic acid, and, applied with a cloth or a brush, it is efficacious in preventing the attack of tree borers. It must not in that state be applied to the foliage.

Bi-Sulphide of Carbon, a very volatile fluid, the fumes of which are destructive to all animal life, is used for killing insects underground; this is done when the plant is dormant, by boring a hole into the ground and pouring in a little carbon bi-sulphide and kerosene mixed. It is highly inflammable.

Coal Tar is excellent to drive insects away or entrap them.

Hot Water, at a temperature of about 125 degrees Fahr., is very efficacious for killing plant lice. Amongst other substances which are used against insects must also be mentioned lime and gas lime, quassia chips, kainit, fir-tree oil, sulphate of copper.

Natural Checks.—Although economic entomologists have already tested many valuable insecticides, and so compounded them that they kill insects but leave plants uninjured, yet there is, in keeping noxious insects in check, even more efficacious allies than the spray pump and the insecticidal mixtures.

All insects, injurious or beneficial, have many natural enemies of their own to contend with. Some are of a higher order in the scale of animal classification, such as lizards, frogs, and other reptiles; birds, moles, &c. Others, more numerous, belong to the insect world itself.

Amongst these, some which attack noxious insect pests from the outside, and either devour them or suck their vital juices, are called *predaceous* insects, *e.g.*, ladybirds, spiders, soldier bug, black ground beetle.

Others, called *parasitic* insects, differ from the predaceous ones, in so far as they live inside the bodies of their victims, and ultimately kill them. Amongst these parasitic insects the more numerous are ichneumon wasps, which entomologists classify amongst the hymenopterous, or four-wing flies. Another class of flies, with only two wings, and for that reason known as dipterous insects, contribute largely to the ranks of insect parasites.

But even those parasites are frequently subject to the attack of still smaller parasites, which prove as fatal to them as they did to their insect hosts. The first of these parasites are, for that reason, known as primary parasites, to differentiate them from the second, called secondary parasites. When introducing parasites into an orchard or a garden, therefore, it is of the greatest importance that we should have a clear idea whether we are introducing an ally which will prove beneficial, or whether we will add to the list of our pest enemies another insect which will prove mischievous. Such a work is better left in the hands of experienced people, and may prove a dangerous tool in those of the tyro gardener.

Besides insect parasites, injurious insects are also attacked by even more minuscule foes. These are germs of contagious diseases, which, at times, stop an insect plague with remarkable suddenness.

These germs are of two orders: some bacterial and inward, *e.g.*, green potato and tomato caterpillars; others, superficial, cover their victims with silk-like threads, and belong to the mould family, *e.g.*, the African locust fungus—the housefly fungus.

GARDEN AND ORCHARD CROPS—THEIR PESTS AND REMEDIES.

In a tabular form, I have grouped those insect and fungoid pests which attack our orchard and garden crops. A few words concerning the more prominent amongst these pests will follow.

GARDEN AND ORCHARD CROPS—THEIR PESTS.

Note.—Pests marked thus * have not so far been observed in Western Australia. The intensity of the disease will regulate the requency of the treatment.

Plant.	Disease.	Directions for Application.
Apple	Scab (*Fusicladium*)	Before buds start, No. 1, 2, or 6. Before blossoms open, No. 3. When fruit sets, No. 3. End of the year, No. 3 or 4. Later on, if necessary, No. 3 or 4.
	Monilia or Mummification	Gather fruit left hanging, and burn. Burn gummy degeneration of wood. Wash stems before spring with 10 per cent. solution sulphate of iron. Follow up with No. 3.
	Bitter or Ripe Rot	Collect and burn diseased fruit. When fruit is fully grown, every fifteen days No. 3, 4, or 15.
	Bitter Pit	Before buds start, No. 1. When fruit sets, No. 3. When fruit is fully grown, No. 3 or 4. Sub-drain and fertilise with lime and potash.
	Mouldy Core	When fruit is fully grown, No. 3, 4, or 15.
	Water Core	More prevalent in moist seasons, especially in early sorts; not very injurious.
	Powdery Mildew	Before buds start, No 1 or 2 Every ten or twelve days in infested nurseries, No. 3 or 4. In summer, sulphur.
	Canker	Cut back and burn diseased branches. Apply No. 6 or 9.
	Sun Burn	Low heading, apply No. 9 on stem and main limbs.
	Fumagine or Sooty Mould	Remove scale insects and fumagine will cease. Apply No. 14. Starch, ¼ lb. in hot water, 1 gallon, will, when dry, peel off and leave tree clean.
	Woolly Aphis	In winter, No. 6, 10, 14, or 20. A fortnight after, No. 10 or 14. Use blight-proof stock and No. 9.
	Black Aphis	At first appearance, No. 7, 8, 14, or 18.
	Red Spider and Mites	Clean cultivation. In winter dress limbs with No. 6. Later on, 15, or powdered sulphur. Two or three dressings during spring and early summer.
	Codlin Moth	Clean all loose bark away. Use and visit cloth traps round trunks. Spray No. 12 or 13 before and after blossoming.
	Cut Worms	Towards the close of the afternoon place a little lump of No. 16 close up to the tree or plant. A ring of kainit round plants acts as fertiliser as well as a repellant.
	Scale Insects	In winter No. 6, 10, 14, or 20. Two or three applications at frequent intervals if necessary. Hydrocyanic gas treatment.
	Leaf-eating Insects	No. 11 or 13 whenever necessary.
	Bud and Bark-eating Beetles	Shake tree in the cool of the morning, and collect insects on sheet of brown paper or calico. Spray with No. 11, 12, or 13.
	Borer	Look on dying or dead limbs for excreta indicating the presence of borers. Plug holes with probe dipped in carbolic acid and tar. Cut off and burn badly injured branches. Use No. 9.
	Fruit Fly	Carefully pick and burn all affected fruit before grubs leave to pupate in the ground.
	Moss and Lichen	Whitewash or spray with No. 1 or 6.
Pear	Scab	Same as for Apple Scab.
	Phytoptus (Mite)...	Same as Red Spider and Mites on Apple.
	*Pear Slug...	Wait till slugs appear and then use No. 11, 12, or 13.
	Codlin Moth	*See* under Apple.
	Red Spider...	*See* under Apple.
	Aphis	At first appearance, No. 7, 8, 14, 18, or 20.

Pear—*continued*...	Scale Insects	*See* under Apple.
	Leaf-eating Insects	No. 11, 12, or 13, whenever necessary.
	Bud and Bark Nibbling Beetles	*See* under Apple.
	Fruit Fly	*See* under Apple.
Currant	Scale Insects	*See* under Apple.
Gooseberry	*Mildew	Potassium sulphide (liver of sulphur), ½ oz. to 1 gallon of water every two or three weeks.
Almond	Leaf Rust	Collect and burn diseased leaves. In spring and summer, No. 3 or 4.
	Shot Hole	Collect and burn diseased leaves. Before buds burst, No. 1. When fruit is set, No. 3; later on, No. 4.
	Gumming	Pare off with knife and gouge out diseased wood. Paint over with shellac or other protective cover after swabbing with carbolic lotion.
Apricot, Peach, Nectarine, Plum	Curl Leaf	Before buds burst, No. 1 or 6. When fruit is set, No. 3.
	Black Peach Aphis	In winter gas lime, kainit, fresh manure, or No. 15 round stem. In spring, No. 7, 8, 14, 18, or 20.
	Other Aphides	In spring and summer, No. 7, 8, 14, or 18.
	Leaf-eating Insects	No. 11, 12, 13.
	Bud and Bark-eating Insects	*See* under Apple.
	Scale Insects	In winter, No. 6, 10, 14, or 20. Repeat applications two or three times, or use No. 18.
	*Slug	*See* under Pear.
	Borers	*See* under Apple.
	Red Spider and Mites	*See* under Apple.
	Fruit Fly	*See* under Apple.
	Sour Sap	Liberally fertilise with superphosphate of lime. Cut hard back when first signs of wilting show in spring. Paint with No. 9.
Cherry	Leaf-eating Insects	*See* above.
	Bark-eating Insects	*See* above.
	*Slug	*See* under Pear.
	Borers	*See* under Apple.
	Gumming	*See* under Peach.
	Fruit Fly	*See* under Apple.
Lemon, Orange, and other Citrus Trees	Mites	*See* above.
	Melanose	Prune away diseased parts and burn. No. 3 with a little soap to facilitate wetting of the leaves when the fruit sets, and again when half-grown; No. 1 or 2 before blossoming.
	Maori or Mites	No. 7, 15, or powdered sulphur.
	Black Aphis	No. 7, 8, 14, or 20.
	Scale Insects	*See* under Apple. Protect ladybirds and scale parasites. Hydrocyanic gas treatment. Omit No. 6.
	Leaf-eating Insects	*See* above. For Red Scale: Sal Ammoniac, ¾ oz. to 1 oz. in water, 1 gallon; spray two or three times at a fortnight's interval.
	Bark-eating Insects	*See* above.
	Crown Rot (*Mal di Gomma*)	Avoid deep planting, stagnant water; pare off with a knife; swab with carbolic lotion and paint over; avoid organic manures; sometimes caused by crickets hidden in mulching. Avoid lemon stock.
	Die Back	Often due to excess of organic nitrogenous manures. Often seen on peaty soil. Drainage. Fertilisers. No. 1, 2, or 3, if due to fungoid parasites.

GARDEN AND ORCHARD CROPS—THEIR PESTS—*continued.*

Plant.	Disease.	Directions for Applications.
Loquats	Black Spot (*Fusicladium eriobotry*)	Cut off and burn all desiccated, diseased fruit. No. 1 or 15 at a week's interval after fruit has set.
Beans	Aphis	Spray with No. 7, 8, 9, 14, 15, 19, or 20.
	Leaf-eating Insects	Spray with No. 9, 10, or 11, whenever necessary.
	Anthracnose	*See* Peas.
	Bugs	Hand picking.
Beet	Leaf-boring Fly	Pick off and burn affected leaves.
	Aphis	Spray with No. 7, 8, 10, 14, 15, 19, or 20.
Cabbage	Moth and Caterpillar	Spray with No. 11, 13, or 19, or sprinkle with Paris green 1 oz., in flour or lime, 5 lb.
Cauliflower	Boring Moth (Ball Head)	Cut and burn as soon as noticed.
Radishes	Leaf-eating Insects	Spray with No. 11 or 13.
Turnips	Slugs	*See* below
	Stinking Head of Cabbage	Caused by a yellow bacterium. Rotation of crops. Suppress cruciferous weeds, destroy slugs and cabbage-feeding caterpillars.
Fig	Fruit Bugs	Hand picking.
	Scales	*See* above.
Mulberry	Fruit Bugs	Hand picking.
Olive	Scale Insects	*See* above.
	Fumagine	Remove scale insects and fumagine will cease.
Onion	Thrips	*See* Red Spider and Mites under Apple.
	Rust	Spray with No. 1, 2, or, 4.
Peas	Anthracnose	Sow clean seeds, or pickle them in bluestone solutions like wheat. Burn diseased vines and trash. Rotation of crops. Spray with No. 1, 2, 3, or 4.
	Pea Weevil	Directly after picking, place peas for one hour in stove at 145 deg. F. Close bin and produce an atmosphere of carbon, bi-sulphide fumes.
Potato	Leaf Blight	Plant sound tubers. Spray with No. 1, 2, 3, or 4.
	Scab	Soak seeds for two hours in corrosive sublimate. 2 oz. in 20 gallons of water.
	Boring Moth	No. 11 or 13. Store under ground if possible. 3 oz. in 10 gallons of water,
	Leaf-eating Insects	*See* above.

Roses	Rust	In winter, No. 11 or 13. In spring and summer, No. 3 or 4.
	Mildew	Sulphur or No. 15.
	Aphides	*See* above.
	Leaf-eaters	*See* above.
	Bark-nibblers	*See* above.
	Mealy Bugs	Sulphur or No. 15.
Strawberries	Leaf Blight	Destroy affected leaves. In bad cases mow the bed and make a litter; burn leaves over plant. Spray before blossoming, and after fruit is picked, with No. 1, 2, 3, or 4.
	Cut Worms	*See* above.
Tomatoes	Blight (*Cladosporium*)	Spray with No. 1, 2, 3, and when fruit ripens No. 4.
	Black Rot (*Macrosporium*)	Small cherry and plum tomatoes free. Stake or trellis vines. Clean seed. Rotation. Burn diseased vines and fruit; spray every fortnight with No. 1, 2, 3, and later No. 4.
	Leaf-eating Insects	*See* above.
	Boring Caterpillars	Pick and destroy affected fruit.
Vines	Oïdium	Sulphur Par-oïdium, or No. 15, when shoots are 12 inches long; again before blossoming, when fruit is set, and every fortnight until the grapes turn.
	Anthracnose	In winter No. 5. In summer sulphur, lime, and powdered green copperas, or hydrulic cement and sulphur, or par-oïdium powder.
	Mouldy Root	Drainage, liming. In bad case pull out and burn vine.
	Cut Worms	*See* under Apple.
	Leaf and Bark Eating Insects... ...	*See* above.
	Chinch Bugs or Rutherglen Flies ...	Spray with Quibbel's liquid disinfectant, $\frac{3}{4}$ oz. in one gallon of water.
	*Phylloxera	Plant in sand: inject No. 17 in winter. Root up and destroy vine until a general plan of working vines on phylloxera-proof stock is adopted.
	Opossums	Strychnine and tea leaves on pieces of board or tin, nailed on posts and removed in the morning; traps, shooting.
	Vermin	Wire netting; blood-smearing, as high up as rabbits can reach, will keep them away. Baits, traps, shooting.
	White Ants	No. 17. Clean cultivation or arsenical compounds.
	Silver Eyes	Reduce mutton fat, spread on piece of tin, sprinkle with strychnine, and tie up branches of favourite trees. Honey and strychnine, shooting, birdlime.
	Grasshoppers	Clean cultivation. Bait No. 16. Sprays No. 10, 11, 12, or 13. Ditching, rolling, ploughing under of eggs. Introduce grasshopper fungus.
	Wireworms	Autumn ploughing, poisoned baits, rotation of crops.
	Cockchafers (White Grubs) ...	Luring beetles by lights over trays into water with skim kerosene. Collecting larvæ when hoeing; liberal use of potash fertilisers. Protect magpies and birds.
	Slugs	Ducks are good scavengers; No. 7, or tobacco powder over plants; quicklime or ashes round beds; traps, consisting of arsenicated cabbage leaves spread over the ground; thin boards covered with films of grease or rancid butter attract many at night; pick and destroy. Powdered kainit mixed with quicklime, dusted over the plants when the dark comes and the slugs are feeding, kills a great many.

REMEDIES FOR GARDEN AND ORCHARD CROPS PESTS.

No. 1.—BORDEAUX MIXTURE (Full Strength for Winter Spraying).

Sulphate of copper (bluestone) ...	4 lb.
Quicklime (to be freely slaked) ...	4 lb.
Water	22 gallons.

(*a.*) Dissolve the bluestone in 10 gallons of water by placing it in a sack suspended in the water, and moving the sack about, when the sulphate will quickly dissolve. (*b.*) Make a whitewash with the lime, strain to separate the grit, and bring the milk of lime to 10 gallons. Mix *a* and *b*, and make up to 22 gallons. Use only wooden or earthenware vessels. When the foliage is out use the half strength mixture by diluting in double the volume of water. To determine if the mixture is safe to use on tender foliage, insert a new nail or the blade of a penknife for at least half a minute; if copper is deposited on the steel, lime must be added.

No. 2.—BORDEAUX MIXTURE (Modified).

The same with 4 lb. molasses added.

No. 3.

The same as No. 1 or 2, with 44 gallons water. Half strength for tender foliage.

No. 4.—AMMONIA-CARBONATE OF COPPER.

Copper carbonate	1 oz.
Ammonia sufficient to dissolve the copper (about...	1 pint).
Water	10 gallons.

For the last spraying. Does not stain fruit.

No. 5.—SULPHATE OF IRON WASH.

Sulphate of iron (copperas)	5 lb.
Sulphuric acid	½ pint.
Warm water	1 gallon.

Pour the sulphuric acid over the copperas, and then add the water. No metallic vessel should be used. Apply with a swab after pruning, or, better still, just before the buds open. A 10 to 12 per cent. solution of sulphuric acid (6 to 7 quarts of acid in 25 gallons water) is at times used as a substitute.

No. 6.—LIME, SULPHUR, AND SALT WASH.

(*A winter spray for deciduous trees only.*)

Quicklime	8 lb.
Sulphur	4 lb.
Salt	3 lb.
Water	12 to 80 gallons.

Boil till the sulphur is quite dissolved, one hour or so, 2 lb. quicklime, freshly slaked, 4 lb. sulphur ground to a powder if necessary, and 5 gallons water. It will turn amber colour. Then slake the remaining 6 lb. lime in a cask, and add the salt previously dissolved in water. When dissolved, add to the lime and sulphur, and boil half an hour longer. Add enough water to make 12 gallons, stirring all the time. Strain through a cheesecloth sack. Apply lukewarm in winter, and be careful of hands. In Western Australia, where the lime contains a large amount of sand, use 10 lb. quicklime.

No. 7.—Tobacco Decoction.

Home-grown tobacco, leaf and stem, or tobacco waste	1 lb.
Water	6 gallons.
Soft soap	1 lb.

Steep the tobacco in the soap in water; strain, and use in two applications at three or four days' interval.

No. 8.—Quassia Chips and Whale Oil Soap.

Quassia chips	1 lb.
Water	1 gallon.
Whale oil soap...	½ lb.

Boil the quassia chips and water for half an hour; then stir in the whale oil soap. When using, dilute with 10 gallons of water.

No. 9.—Sulphur and Lime Paint.

Boil for half an hour—

Sulphur	1 lb.
Quicklime	2 lb.
Water...	3 gallons

and thicken to consistency of paint, with fine clay or with flour, and brush over stems and limbs after pruning.

No. 10.—Kerosene Emulsion.

Kerosene	2 gallons.
Soap	½ lb.

Boil the soap in 1 gallon of water. When boiling remove to another vessel, add the kerosene and churn violently for 10 minutes, or pour with a fall from one bucket into another until the whole forms a creamy mass which thickens on cooling. Will keep. When used, to 1 part of the emulsion add 8 to 10 parts of water, according to season. The time required to effect a complete emulsion will depend on the violence of the churning and the temperature of the mixture.

No. 11.

Same, with 1 oz. Paris green to every 12 to 15 gallons of the emulsion.

No. 12.

No. 1, with 1 oz. Paris green to every 12 gallons of the mixture.

No. 13.

Paris green	4 oz.
Water	50 gallons

or 1 oz. to 12 gallons. The addition of a little lime will neutralise the caustic property of the arsenic. A little glue or flour will ensure its adhesion to the leaves. To mix well, first make into a thin paste with a little water.

No. 14.—Resin and Soda Wash.

Resin (pounded)	5 lb.
Caustic soda (70 per cent.)	1 lb. or
Washing soda	3 lb.
Fish oil	1 pt.
Water, to make	25 gallons.

Boil ingredients, with enough water to cover, for 1 to 2 hours, adding water slowly if there is a tendency to boil over. The compound will assume the colour of black coffee. Ascertain that mixture will assimilate with water by occasionally pouring a small quantity of mixture into water. If not boiled sufficiently will form a ropy mass in bottom of vessel. Dilute with warm water, stirring all the time to one-third, the first bulk (8 gallons) making a stock mixture to be diluted to the full amount when used. This mixture can be used twice or three times as strong on deciduous trees when dormant.

No. 15.—Liver of Sulphur.

Potassium sulphide	$\frac{1}{2}$ oz. to 1 oz.
Warm water	1 gallon.

No. 16.—Bait.

Bran	10 lb.
Paris green	4 oz.
Molasses	4 lb.

Worked with water to the consistency of stiff dough into balls, and laid at the foot of the plants for cut worms and grasshoppers.

Fresh leaves of vegetables, sprinkled with Paris green and water, laid about also make a good bait.

No. 17.—Carbon Bi-sulphide.

Apply with Vermorel's Injector; dose, 10 to 20 grammes to the square yard, or close up to where white ants or phylloxera are.

Bi-sulphide of carbon	1 part.
Kerosene	1 to 2 parts.

No. 18.—Hydrocyanic Gas.

For every 100 cubic feet of space to be fumigated—

Potassium cyanide, 98 per cent.	$1\frac{1}{2}$ oz.
Sulphuric acid	$2\frac{1}{2}$ oz.
Water	3 oz.

To generate the gas pour the acid slowly into the water in a deep cup or earthenware vessel, add the cyanide to it, and retire quickly, taking care not to inhale the fumes, which are highly poisonous. Fumigate 45 minutes to one hour. This is the stronger winter treatment for deciduous trees when the leaves are off. For summer treatment and for evergreens use half the quantity of chemicals. Cyanide of potassium is a deadly poison.

No. 19.—Tar Water.

Boiling water	2 gallons.
Coal tar...	1 lb.

Add tar, drop by drop, to boiling water, and stir violently. If the tar is added in bulk it will not mix. When dissolved, make up to 100 gallons with water. Spray under as well as upper surface of leaves.

No. 20.—Whale Oil Soap.

One pound to 2 to 4 gallons water for scale insects; 1 lb. to 4 to 6 gallons for mealy bugs, aphides, red spider, &c. Good's No. 3 potash soap, one of the best, made of fish oil, and not more than 25 to 28 per cent. water.

Plate XLI.

SULLIVAN'S EARLY WHEAT ON THE MARANOA. (NATURAL SIZE.)

Botany.

INDIGENOUS QUEENSLAND GRASSES.

Mr. F. M. Bailey, Colonial Botanist, in the introduction to his "Descriptive Catalogue of Queensland Grasses," written for the Greater Britain Exhibition at Earl's Court, London, says that, "in very few localities or situations are grasses entirely wanting. Our dense scrubs have kinds peculiar to them which are only awaiting the hand of man to bring them out into cultivation, and it is gratifying to know that, in the few instances where this has been done, success has crowned the experiment."

Amongst the few experimenters are some of the farmers on the Daintree River, whence Mr. Pentzcke sends us several varieties for identification.

These, as identified by Mr. Bailey, are:—*Paspalum conjugatum, P. scrobiculatum, P. Galmarra*—or Russell River Grass, and *Panicum Crus Galli var. Subulicolum.*

Concerning these, Mr. Pentzcke remarks:—

Paspalum conjugatum.—After having well investigated the merits of this grass, I conclude it to be one of the best. I found it to be a native of the Daintree scrubs, whence it has found its way to the clearings. It has been growing on one selection (Mr. Baumann's) for three or four years, and that gentleman says emphatically—"I dont care what you call the grass, but it will hold up my sloping ground, and, in spite of the horses trampling it down, it covers the ground, looks healthy, has destroyed the couch grass, the horses like it, and it can be ploughed out at any time."

Paspalum scrobiculatum.—This is a native of tropical Queensland. It can hold its own against couch grass, and is very nourishing for stock.

Paspalum Galmarra.—This is the Russell River grass, named by Mr. F. M. Bailey, but Mr. Pentzcke did not know any other name for it than the local one of "Duffin Grass," due to its having been introduced on the Daintree by Mr. Duffin, late Crown Lands Ranger, at a time when there was no grass at all. He distributed it to the selectors, and now it grows everywhere. It is a good grass, and fowls are very fond of its seed, which it produces in profusion.

Panicum Crus Galli.—This, although a native grass, improves by cultivation, and thrives best when the soil is lightly dressed with salt. In its wild state, it grows best in brackish swamps or on the river banks within reach of tidal waters. Under favourable conditions it attains a height of from 5 to 6 feet. It would probably do well if planted near some of the western artesian bores where the water is charged with certain salts. Stock are so fond of it that they will go into deep water to obtain it. The *Crus Galli* is an annual, all the others are perennial.

SULLIVAN'S EARLY WHEAT.

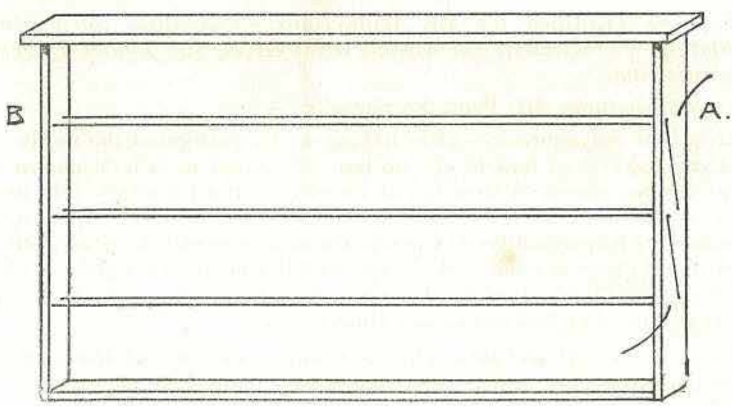
The fine sample of wheat here illustrated is from a sample taken from a sheaf of Sullivan's Early exhibited at a flower show held at Roma on the 23rd September last. This wheat was introduced into the Maranoa district by Mr. Miscamble a few years ago, and has proved itself well adapted to our Western country. It is a heavy yielder, rust-resisting, and a good milling wheat. Our illustration shows the natural size of the ear.

Apiculture.

HOW TO PREVENT FOUNDATION FALLING OUT OF FRAMES.

By H. R. STEPHENS, Toowoomba.

As during the present swarming season trouble and annoyance are sometimes caused by the foundation falling out of the frames when given to new swarms, I wish to point out that a useful and very satisfactory way to prevent this is to double the wire at the top of the frame so that the foundation there is between two wires, and so is very unlikely to fall down under the weight of a newly clustered swarm. It is very aggravating to go to a hive a day or two after the swarm has been introduced and to find several frames built together in an irregular manner caused by the falling of the foundation, and thus necessitating removal, with a possible waste of eggs which the queen may have started to lay.



To Double-wire the Top Holes.

The wire is passed from A to B, twisted at B, and the end brought to A again, allowing about 2 inches for fastening it at A. When the foundation is in place, the other end of the wire is threaded through the frames and fastened in the usual manner. Foundation fixed in this way is much better than when simply embedded in wax alone. The loose end of the wire is embedded last of all.

Agricultural Patents.

PATENTS ACCEPTED.

7620. Alexander Gillies, of Terang, Victoria, Australia, dairyman. "Improved Method of and Means for Pulsating Inflatable Teat Cups of Pneumatic Milking Apparatus." Dated 16th May, 1903.

7738. Austin Willoughby Wildman Smith, of Yarrabine, Tiaro, Queensland, grazier. "A New or Improved Means for Attaching the Breeching of Harness to Vehicles whereby the use of Straps is dispensed with and Detachment Prevented." Dated 20th July, 1903.

7254. Alexander Gillies, of Terang, Victoria, Australia, dairyman. "Improvements in Pneumatic Milking Apparatus." Dated 11th May, 1903.

Tropical Industries.

COTTON.

In all the tropical British possessions, cultivators of the soil are turning their attention to cotton growing. Owing to the short supplies which are now reaching the British cotton factories, it is imperative that the required quantity shall be made up from British colonies. Already the West Indies have entered into the business with determination; East and West Africa, and Ceylon also, are growing large areas, but Queensland, which can produce cotton equal to any grown in the United States of America, Egypt, or the South Seas, is still apathetic. Where sugar-cane and fruit are not grown, and where dairying is not carried on on the coast lands, there the farmer still sticks to the traditional "corn and potatoes." Undoubtedly, maize and potatoes are as much needed as sugar and wheat, but why put all the eggs in one basket is what we continually ask? Five acres of cotton out of 100 acres of cultivation is a small thing to look after, but it will produce a nice little cheque at the end of four or five months after sowing. For the benefit of those who are trying cotton once more, we shall publish everything of interest bearing on the subject. This month we reprint an article from the *Tropical Agriculturist,* Ceylon, giving the main features of an address delivered by Dr. Morris, Commissioner of Agriculture in the West Indies.

VARIETIES OF COTTON.

The more widely cultivated variety is that known as Upland cotton. The plants are usually low bushes, and the cotton is short-stapled, the lint being not more than two or three times the length of the seed (about 0·93 inch). What is known as Sea Island cotton is a special variety, described as a native of the West Indies. It has a fine, long, silky lint (1·61 inch), three or four times the length of the seed. It is cultivated on a small scale only in the islands off the coast of Georgia and Carolina. It is seldom profitable to grow this in localities more than 30 miles from the sea.

The Sea Island cotton is recommended for trial in the West Indies, side by side with the best varieties of Upland cotton. The return of Sea Island cotton is usually less than that of Upland cotton, but the increased price obtained for it more than compensates for the diminished yield.

SOIL AND CULTIVATION.

In regard to soil there is no difficulty likely to arise, as cotton is at present cultivated on nearly all kinds of soil.

On sandy soils the yield of cotton is usually small. On clay lands, especially in wet seasons, the plants attain a large size, but yield a small amount of lint in proportion to their size. The best soils for the crop are medium grades of loam.

In the United States 4 feet is the usual accepted distance between the rows, and the distance between the plants is within the limits of 8 to 14 inches. Experiments made at the Georgia Experiment Station for five years to determine the best distance between cotton plants indicate that on land so rich or so well fertilised as to produce one and one-third bales (666 lb.) of lint per acre, the best distance is 4 feet between the rows and 1 foot apart in the rows.

In Carriacou cotton is planted in rows 3 feet apart and 2½ feet in the rows. This is probably too far in the rows.

The planting season commences in the States in the spring of the year, just as all danger from frost is over, and the time the crop takes to mature varies between 120 and 157 days. The reaping season is about 30 days more, viz., in July, August, and September. That would be about twenty-six weeks, or six months for the whole crop.

In 1 lb. of cotton seed there are about 3,800 to 4,000 seeds. At three seeds to a hole 1 lb. would plant from about 1,250 to 1,300 holes. For fields planted in rows 4 feet apart and 1½ feet apart in the rows, from 5½ lb. to 6 lb. of seed would be required to plant an acre.

The seed, after the oil is extracted, contains a large proportion of the manurial constituents required by the plant. On the average of 204 analyses of this meal it was found to contain 6·79 per cent. nitrogen, 2·88 per cent. phosphoric acid, and 1·77 per cent. potash.

Cotton seed meal is also one of the most valuable of the meals used for feeding live stock. If cotton seed meal and the hulls are returned to the soil there will be hardly any necessity of applying other manures, and the most advantageous way of doing this is to feed the meat and hulls to the animals and to applying the resultant manure to the land.

TIME TO PLANT.

For the West Indies it is probable that the best time to plant cotton will be in July and August (for Queensland, August and September). The crop should then come in early in December and January, and be completed, say, by the end of February. Close planting will have a tendency to produce an early crop, and wide planting the reverse. If local seed is intended to be used for planting, it should be selected with great care from strong and heavy-bearing plants. By this means a special race of cotton might be raised to suit local conditions.

PICKING.

With regard to picking cotton in the West Indies, the people may not be able, at once, to pick large quantities per day. The difficulty is to remove the lint quickly and completely. When the pickers go into the field, it is necessary to place three fingers into the pod and remove the whole of the cotton at once, leaving the pod perfectly clean. At one time it was thought that 100 lb. a day was a fair average, but that is now considered rather small. In fact, there are keen and experienced pickers in the United States able to pick as high as 300 lb. of cotton a day. I saw women moving between the rows, picking the cotton and putting it into large pockets in their aprons. When they go to the end of the rows they emptied the cotton into bags or baskets. These were again emptied and the cotton taken, after drying, into the ginning house. In some cases, dependent on the climate, it is necessary to give the cotton an extra drying before it is put through the gins.

As regards the quality of cotton growing here, specimens are before you, and you will be able to judge for yourselves. The Sea Island cotton, which is a native of the West Indies, is of considerable value, owing to the length and silkiness of the fibre.

YIELD AND COST.

According to a Texas Station Bulletin, No. 26, of March, 1893, the average yield on seven farms was 392 lb. of lint, the average selling price 8 cents per lb., the expenses per acre 16.96 dollars, and the profit 14.60 dollars. The cost for ginning, packing, &c., being paid for by the value of the seed.

Again in Texas in 1892 the average cost of growing cotton on twelve farms was 22.62 dollars per acre, the lint was 415 lb., the price of lint was 9.6 cents per lb., and the average net profit per acre 15.77 dollars. No charge for management was made with the exception of one farm. It is stated that "the profit was large—larger, perhaps, than any profit from any staple cultivated on so extensive a scale."

In these colonies the cost of producing cotton should be less than in the United States. The estate system of cultivation for sugar-cane would exactly suit cotton, and if the lighter soils, not so remunerative for sugar, were planted in cotton, the results might be of distinct advantage to the planting community. There would, also, be added, in some of these colonies, an important auxiliary industry to those already existing.

By-Products.

The by-products of cotton comprise four separate articles, namely, (1) linters, (2) oil, (3) meal, and (4) hulls. If you obtain a return of 1,200 lb. Sea Island cotton per acre, you will have 400 lb. of lint and 800 lb. of seed. The proportion is exactly 1 to 2 by weight. If you examine the seed of the cotton you will find that the outside of it is covered with a crust or husk. If you break this you come to a whitish substance, called the kernel. In factories dealing with cotton seed they first of all remove the fine linters on the outside of the seed. Next they decorticate the seed and remove the hull, that is, the hard crust on the outside. That was at one time thrown away; now it is ground into a kind of bran, which is found useful for feeding animals. The kernel contains a large proportion of oil. A ton of seed contains about 50 gallons, but at present they can only extract about 45 gallons of this oil. When they have extracted the oil they have left a cake or meal also valuable for feeding purposes.

With regard to the percentages of the various parts of the entire seed, the meal will be 34 per cent., the oil will be 20 per cent., the linters will be 35 per cent., and the hulls 10 per cent. A more definite idea will be obtained if we calculate the amount of each which would be obtained from the average yield of an acre of cotton. This we will take as 900 lb. of seed cotton yielding 300 lb. of lint and 600 lb. of seed.

On this basis we should obtain (besides 300 lb. of commercial lint) from 1 acre:— Meal, 205 lb.; oil, 120 lb., or about 15 gallons; hulls, 215 lb.; linters, 60 lb.

Samples of Cotton.

There are exhibited to-day samples of cotton grown in Barbados that very clearly show the suitability of the soil and climate for cotton cultivation. There are twenty-four estates on which experiment plots are now established. These cover about 16 acres. The specimens before you have been kindly contributed by Mr. Alistair Cameron from Kent plantation. They show healthy, vigorous, growth, and the lint is silky and of good length. There are a few acres growing also at Sandy Lane and elsewhere under the care of Mr. H. E. Thorne. A sample of cotton received from Trinidad belongs to the sort known as "Kidney" cotton. In this the seeds are massed together in the centre of the lint. This is typical of some Brazilian and Peruvian cottons, but is not likely to be the best for the West Indies. It cannot be cleaned by roller gins, and the staple is short and somewhat coarse.

CARAVONICA COTTON.

By DAVID THOMATIS, Cairns.

In the address of the Imperial High Commissioner for Agriculture in the West Indies (Dr. Morris), portion of which was inserted in last issue of the *Journal* (page 273-277), it is stated that the special variety of Sea Island cotton possesses the longest staple, viz., 1.61 inches, whereas the ordinary Upland staple is barely 0.93 inches. Let me inform Dr. Morris that the average length of the staple of Caravonica cotton is over 1.50 inches, and some threads exceed 1.65, which is more than the length of the true Sea Island, and as to strength, that of the Caravonica cotton is more than double that of the Sea Island, as actually tested. Then at page 279 of the same issue, I notice a reference to a Peruvian cotton seed sent to the Colonial Office by Messrs. Praschkauer and Co., 112 Fenchurch street, London, which they consider a quality "unrivalled in any part of the world," and they imported it from Northern Peru. I am fully convinced in my mind that the cotton variety spoken of by Messrs. Praschkauer and Co. must be the identical variety I procured myself two years ago from the Savary River (a tributary of the Amazon), on the boundary between North-eastern Peru and Brazil, and probably that variety has lately become prominent by having been chosen by me for successful crossing purposes. But that variety is no longer "unrivalled," since I improved it by crossing it with a Sea Island, of Mexico, thus diminishing its roughness, and imparting to it a large degree of fineness and silkiness; and, therefore, the "Caravonica cotton should decidely be the "champion of the world.'

Dr. Morris seems to have experimented on acclimatising Peruvian cottons in the West Indies, but, probably, not having resorted to hybridisation with a suitable Sea Island, the results he obtained must have been insignificant, as his "Sandy Lane" was pronounced by English experts "to be not rough enough for Peruvian, and too rough for American, and, therefore, probably very slow of sale."

I am very sorry to say that I fear the Caravonica cotton will not thrive outside the tropics, unless it is first subjected to acclimatisation and cultivation for two or three years, which operation the Department of Agriculture might well undertake. [The Department has already procured seed of the Caravonica cotton from Dr. Thomatis, and experiments in acclimatisation are in hand.—ED.—*Q.A.J.*]. I am trying it on top of the Range, near the Barron Falls, at a height of over 1,500 feet, where in winter the thermometer falls to 35 degrees Fahr. The plants were not affected at all this winter, and they have commenced flowering. The planting season should be, however, in December or January, and not September, because, by nature, this variety will flower and bear from now to Christmas, which is the proper season, being during our dry weather and hot days. In some of the trees, I noticed last January, a few blossoms (all yellow) of the Mexican Sea Island, which I at once destroyed, so as to force the tree to blossom and bear in September. No blossom of the Peruvian variety (yellow, with purple top fringe), appeared last January, keeping to the season of the south tropics, in which Peru and Brazil are like North Queensland. The hybridised flowers coming on now are fully crossed, being possessed of purple spots at bottom of petals, and of a large purple fringe on the tip of the petals.

COTTON CULTURE.

Owing to the modern economical and social conditions obtaining at present, in Australia especially, the annual variety of cotton cannot possibly be any longer a remunerative crop with European labour, and I very much doubt whether it can be so even with cheap black labour in America and Central Africa, besides yielding such a poor quality of staple that, in competition with the long, strong, and regular fibre furnished by various varieties of tree-cotton, there is no chance for the annual variety to survive in the trade, even if it should be kept on in the fields.

Of the several varieties of tree-cotton, the one I have produced recently (Caravonica) has been declared by the best authorities in Europe to be the best and the most valuable. It is a native of North Queensland, so it should devolve on us Queenslanders to plant it in every corner of this State, and also in the Northern districts of South Australia and Western Australia and in New Guinea. In my opinion, it will be a most remunerative crop, and North Queensland is its very cradle and home, as, in fact, are all tropical regions.

I would now suggest that this new variety, which grows to a good-sized tree, be planted all along the railway lines, and its crops placed in charge of the lengthsmen; also, in all school grounds, and the crop to be a source of income to the children, the teachers, and the school committee; also, round every country police station, the crop to be given to the police officer's family. Thus a fair amount of production would be obtained, and, moreover, it would furnish a practical school of cotton culture.

THE *MELBOURNE HERALD* ON AN AUSTRALIAN COTTON

More than forty years ago Mr. A. C. Macdonald, now secretary to the Royal Geographical Society of Australasia, read a paper before the Geelong Horticultural Improvement Association on the cultivation of cotton and its possibilities so far as Australia might be concerned. At that time the War of Secession had broken out in America, and England, almost entirely dependent on the States for her supplies of cotton for her mills, especially those in Lancashire, was in sore straits. The ports of the South were closely blockaded. It was only by daring and successful "runners" that any of the Southern States' cotton could reach or be imported into British ports at all.

Previously to that, however, the necessity of making efforts to produce cotton in British colonies had been recognised, and the East India Company had established an experimental farm in the Deccan, under Mr. Robert Whyte, a well-known and distinguished botanist. Subsequently, while the war was in progress, the Queen's Government in India appointed a special commissioner, Mr. Paterson Saunders, and that gentleman, from his knowledge of the country and its inhabitants, backed up by practical experience, was enabled to furnish a report which proved of great value, and tended largely to push forward an industry which had been falling off, so that, while in 1857 the value of cotton exported from India to Great Britain had been only £5,458,426, it had increased in 1886 to £25,270,547. As a matter of historical fact, India had produced and manufactured cotton five centuries before the Christian era, and even now she is the largest producing country in the world, except America, the cotton from which has been certainly the most acceptable to manufacturers.

The Lesson of the War.

There is no doubt that the lesson the American civil war taught the British millowners was a sharp one, and caused them to look out for other markets from which they might draw their supplies. From a climatic point of view, in the colonies and dependencies of Great Britain, it was shown that, irrespective of India, cotton could be grown in sufficient quantity to meet any emergency, but, somehow or other, as soon as the civil war was over, and America once more returned to cotton-growing, the pressing impetus was removed, and the temporarily created industries began to languish and wither for want of enterprise, and, to put it mildly, ignorance of, or indifference to, surrounding conditions and local influences.

The Reviving Interest.

The situation has, however, now changed, and we are brought face to face with the chance of another cotton famine in England through the falling off of the American cotton supply, not caused by war, but principally by the action of a trust. The existence of this indicates the necessity of Great Britain ceasing to be dependent on an outside country for her supply of a raw material which can, and ought to be, grown within the bounds of the Empire itself. As was contended at a meeting of the Royal Geographical Society of Australasia, it may be grown at several places on the continent of Australia and on some of the adjacent islands.

MR. PANTON'S VIEWS.

Among the papers read at the meeting alluded to, held on 13th July, was one by Mr. Panton, who thought that the present situation was an opportunity for Australia to show that she could aid the Empire in the industrial field by furnishing Britain with a cotton supply, and that it was a subject which should engage the attention of the Commonwealth Government at the earliest possible moment. After alluding to the fact that South Sea Island cotton had already been grown with success, Mr. Panton then proceeds to deal with the districts which he considers suitable for the growth of the best class of cotton, as follows:—

"I commence with the valley of the Asburton River, which is, roughly speaking, about 50 miles outside the tropics. From this point north and east around the coast to the River de Grey, embracing a corner of our continent, of an area slightly greater than this State of Victoria, and watered by the Rivers Fortesque, Asburton, Yule, de Grey, and their tributaries. The whole of this territory is occupied by pastoralists and miners. It is about 500 miles in length, by about 200 in width. Although within the tropics, it has not the benefit of the regular monsoon rains, and may be classed as outside their influence, its rivers are only chains of water-holes, and it is therefore placed by me as only favourable for the cultivation of cotton by irrigation, and that would mean a heavy expenditure in the construction of reservoirs. Still, cotton could be grown there.

"Next, I include the whole of Kimberley, from La Grange Bay to the boundary of Western Australia, which benefits by the outer fringe of the N.W. monsoon rains, and offers the favourable conditions for cotton culture. The soil varies from light, sandy loam to rich volcanic. Water is abundant, and the whole coast is cut up with gulfs, inlets, and harbours. Millions of acres are here available, more especially in the north-east portion, for the growth of cotton, sugar, or coffee. At present it is only occupied by a few hundred Europeans, and produces cattle and a little gold.

"Crossing the north-east boundary, we come to the Northern Territory of South Australia. The valley of the Victoria River ought to be a good cotton-growing country—having plains and open lands on its west bank for 150 miles, and extensive downs of rich volcanic soil on its upper waters, all experiencing regular but not too heavy monsoon rains, and placing this locality in the first rank. Eastward from that to the Katherine River, and south of that to the limestone country of the Elsey Creek, and down the Roper River to the Gulf of Carpentaria, ought to be cotton country, and it is all favoured with the lighter rainfalls.

"Port Darwin receives the full benefit of the monsoon rains, which are experienced southward as far as the Daley River, and eastward along the coast and into the Gulf of Carpentaria to Groots Eiland. There are many rich lowlands fringing the rivers in this portion, known as Arnheim Land, and also some of the tablelands which are suitable for cotton; but, south of this, and inland from Limmens Bight, we have again the more favourable conditions all round. From the Roper to the boundary of Queensland the same climatic conditions obtain, and it is impossible for me to give you an approximate of the extent of land here available for culture, chiefly along the waters of the Limmens and McArthur Rivers, and outside the littoral to the doubtful margin, which I place at about 200 miles inland from the coast. I believe that there are many places on the north coast of Arnheim Land, and on the islands off this coast, that may be found suitable for the culture of the valuable Sea Island cotton.

"Now, I come to Queensland, the heiress to Australia's prosperity from the Gulf. Along the coast even as far as Brisbane and inland, I cannot say how far, she has all that is required for cotton culture in climate and soil."

The Labour Question.

Mr. Panton quite believes in "our determination to reserve Australia for the white man," and that it is more than justified by the terrible experience of the United States with their transplanted negro population, but, believing also that the cotton industry cannot be advanced without labour and capital, he suggests that the north of the continent should be formed into a tropical State, with special laws for coolie labour. He says:—

"We need not fear the coolie creeping south into our midst to disturb the labour market. The bond would turn every employer into a preventive man, the cordon of the waterless interior restricts traffic to a few routes, and, with the passport system strictly enforced and the employer held liable for expenses incurred in capturing and returning runaways, the coloured labourer could be confined to the Tropical State."

In connection with this question readers of *The Herald* will remember that we lately published an interview with Mr. Wilkinson, M.H.R., of Moreton West, Queensland, who is now asking the Commonwealth Parliament for a bonus of ½d. a lb. on seed cotton and ⅙d. a lb. on ginned cotton. The honourable member then said that cotton-picking was the lightest and the cleanest work imaginable, and that it could be carried on without a single black pair of hands.

What Mr. Campbell Thinks.

At the same meeting of the Geographical Society, a paper was handed in by Mr. Campbell, civil engineer, who has recently returned from the Northern Territory of South Australia, in which he states emphatically that "probably in no part of the world can better land be found for cotton culture." He adds and with equal emphasis, on the labour question, as arising out of the competition with cheap black labour in America—

"But even allowing them all the cheap labour, and taking into consideration our more suitable climate, our less expenses in horse labour, our being in a position to grow cotton of the best quality as a perennial, and cultivate it on the Guiana or West Indian principle, which is solely tropical, we could hold our own successfully and at the same time create an industry which would give employment to thousands of settlers, in the cotton farming area of the Northern Territory, in a manner which is at present quite unknown to Australia. That is to say, a cotton planter requires practically the same number of hands all the year round, which is not so with the sheep, wheat, or sugar farmer, who at certain seasons of the year requires a larger amount of skilled labour for a few months only, and during the balance of the season requires very little labour of any kind, consequently the unemployed trouble during the winter time."

A Working Man's Crop.

In another paper written by Mr. A. Macdonald, and read by Mr. Panton, attention is drawn to a letter from Major A. J. Boyd, of the Queensland Department of Agriculture, who says that "cotton is essentially a working man's crop—(the term 'working man's crop' is used as distinguished from a 'poor man's crop,' as coffee has been called, because the poor man cannot grow it). An able-bodied working man can cultivate, pick, and market 10 acres of cotton if he has a family of children old enough to go into the field. Parents might object to their children being taken away from school, but the Education Department can arrange the Christmas holidays in such a manner that the bairns are available to pick the cotton at the proper season." As a matter of fact, in the past, from 1868 to 1882, the quantity of cotton exported from Queensland totalled 12,378,386lb.

On the subject of labour Mr. A. C. Macdonald holds with Mr. Panton that some arrangements will have to be made for coolies, preferably Indians, Japanese, or Chinese, as British subjects or allies, but neither advances any positive proof that white labour cannot be availed of. Certainly good reason has been shown why a full and searching inquiry should be made by the Commonwealth Government into the possibilities and means of giving encouragement to what gives promise of becoming a great industry.

CANE-CUTTING MACHINE.

The *Louisiana Planter* of 13th June mentions a machine for cane-cutting which has been placed on the market by Mr. Jules Gausserin, of Baldwin, La. That journal says that the inventor has come nearer to making a cane-cutting machine than any of his competitors. As has been so frequently brought out in debates before the Sugar Planters' Association, Mr. Gaussiran's machine has been very successful in cutting sugar-cane, but has no device for topping or stripping it. Something of that kind may come later, but he believes, and the evidence of his patrons indicates, that he has now a machine that will successfully cut cane for fall planting or windrowing, and will cut cane for the mill and for windrowing in case of a freeze. Those who are familiar with the work thus far done by Mr. Gaussiran, and as indicated by Captain John N. Pharr, Mr. B. A. Oxnard, and others who have used the machine, will remember that this machine is very effective in cutting cane, laying it in compact windrow on top of the cane ridge, from which it may be easily pulled down into the water furrow with Moore's patent cane hooks, and thus an immense amount of work be accomplished by machines that would ordinarily require more hand labour than is available. In cutting cane for fall planting or for the mill, the cutting of the cane down and laying it in this windrow leaves less than half of the work to be done in the way of stripping and topping, and effects an immense saving in hand labour.

Mr. Gaussiran has materially improved his machine by strengthening all the weak points, and we have no doubt that those he brings on the market this fall will earn for their users many times more than they cost, while they will effect such a saving in labour as will be very gratifying now that the labour problem is becoming constantly more and more difficult of solution.

The *Planter* also publishes Mr. Gaussiran's advertisement, to which are appended most flattering notices of the new machine received from planters. One planter says he has saved 295 dollars on 85 acres of cane by its use. What has become of our Queensland inventions for cane-cutting?

KISHU PADDY OF JAPAN.

The *Tropical Agriculturist*, Ceylon, writes as follows about the above rice seed, of which some has been grown in Ceylon:—

The advantages of the rice from this variety of paddy are stated to be: (1) A larger yield—25 to 30 per cent. more than the best varieties; (2) harder grain, so reducing the percentage of broken grain from 30 to 40 to 3 or 5 per cent.; (3) the straw remains green when the grain ripens, so that the former makes very good hay after the grain is cut.

The plant is described as having a short stem, a thick kernel, and a thin husk.

The seed is said to take a day or two more to germinate than local varieties, and to manure within ten weeks from time of sowing.

We are taking steps to give this new paddy a good trial in the Government Stock Garden.

[We believe that Mr. F. W. Peek received some of this paddy from Japan for seed purposes. Unfortunately most of the rice seed was lost after sowing, owing to the drought of 1902.]

Forestry.

COMMERCIAL ASPECT OF AUSTRALIAN FORESTRY.

Before the members of the British Association at Southport, Mr. E. T. Scammell, F.R.G.S., formerly commercial representative for the West Australian Government, delivered an interesting address upon "The Forest Resources of Australia Available for British Commerce." Mr. Scammell said, speaking of

THE FOREST AREAS OF AUSTRALIA,

that the magnitude and importance of the interests involved may be judged by the fact that the forest areas of Australia comprise 107,037,000 acres of marketable timber, or nearly half the areas of the forest lands of Europe, excluding Russia. Of this area Queensland possesses 40,000,000 acres, New South Wales 20,000,000, Victoria 12,000,000, South Australia 4,000,000, Western Australia 20,000,000, and Tasmania 11,000,000 acres. To this should be added a considerable area in Queensland (over 100,000,000 acres), and in Western Australia (over 70,000,000 acres) covered with inferior timber, which has a local value for building and for general purposes.

Many, if not most, of the important forests of Australia are fairly accessible from the sea, as the best-grown and most valuable timbers are mainly coastal. This especially applies to the belts of jarrah and karri in Western Australia, which occupy clearly-marked and distinct areas on the hill ranges of the south-west, which skirt the coast for some hundreds of miles; and also to Tasmania, whose forests of blue gum and stringy bark grow down to the shores of that forest-clad island. In Victoria the southern forests, which correspond very largely to those of Tasmania, are not far from the sea, while in the northern part of the State, where the timber is akin to that of New South Wales and Queensland, considerable areas border on the River Murray. The subalpine regions of Victoria, however, where some of the finest timber of that State is found, are at present practically inaccessible. In New South Wales and Queensland a number of the largest and most valuable belts of forest land lie between the dividing range and the sea; but in both these States there are large areas too far from the coast to render them serviceable as immediate sources of supply.

THE COMMERCIAL TIMBERS OF AUSTRALIA.

The timbers of the Commonwealth are of many varieties, and some of them of high commercial value. The chief of these, as shown in the great work of the late Professor Baron von Mueller, are the eucalypts, which are indigenous to Australia, and are found in all parts of the country. Of this valuable timber alone there are over 150 species. Besides the eucalypts there are many kinds of casuarinas (the Australian oak), some conifers (the Moreton Bay pine), the cypress pine, the brown pine or colonial deal, and others, many acacias (the Australian wattle), banksias, and numerous other varieties.

At present, however, the range of Australian woods available for British commerce is limited. Western Australia and Tasmania are the only States that have seriously dealt with the question of exporting timber, or of using their forest resources as a valuable commercial asset. New South Wales is beginning to enter the field, and Queensland should be able to utilise her timbers for the supply of outside markets. But before these States can hope to compete with Western Australia or Tasmania, or in any way to command the attention of timber-users in this country, they must issue, under authority, a definite and reliable statement of the timbers available for export. General statements on the subject—of which the Government books are full—are of no practical use, nor are the tests, proving the strength and general value of the timbers, such as those issued by the Queensland and New South Wales Governments, unless accompanied by reliable data as to the timber actually available. For example, two of the most useful eucalypts of Australia—ironbark and tallowwood—to which special attention has recently been called by the New South Wales Government, are said to be so restricted as to render an export trade of any magnitude impossible. There are, however, other varieties of timber in New South Wales and Queensland, of which there should be an ample supply. In the case of Victoria and South Australia, notwithstanding the proposed efforts to conserve and increase the forest resources of these States, there is little probability of any export trade in timber being possible for many years to come. Our attention, therefore, for the purpose of this paper, must be confined, practically, to Western Australia and Tasmania. [Here follows a description of the timber of those States.—Ed. *Q.A.J.*]

NEW SOUTH WALES AND QUEENSLAND.

I do not propose to give any detailed description of the timbers of these States, since, as already indicated, sufficient particulars are not to hand to justify any confident expectations of a continuous supply for commercial purposes. The only timbers from New South Wales that are being exported to any extent are blackbutt (*Eucalyptus pilularis*), which is being used for sleepers and railway wagons, and tallowwood (*Eucalyptus microcorys*), which is being sent to South Africa for use as sleepers. Blackbutt is in colour a lightish yellow or brown. It grows to a height of from 50 to 150 feet, with a diameter of from 2 to 4 feet. Like other Australian hardwoods, it is liable to warp, and requires careful seasoning. There is a difficulty at present in securing large sizes for exportation, for which there is an increasing demand. Tallowwood is of a clear yellow or light-reddish colour when newly cut, but changes afterwards to a pale brown. Its average height is from 100 to 120 feet, and its diameter 6 to 8 feet. Its common name is due to the greasy nature of the wood. It is largely used in Sydney for street paving, and, with blackbutt and box (*Tristania conferta*), is being tried for that purpose in Westminster.

Times of Sunrise and Sunset, 1903.

DATE.	SEPTEMBER.		OCTOBER.		NOVEMBER.		DECEMBER.	
	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1 ...	6·6	5·31	5·31	5·45	5·1	6·3	4·50	6·24
2 ...	6·5	5·32	5·30	5·46	5·0	6·4	4·50	6·24
3 ...	6·4	5·33	5·29	5·47	4·59	6·5	4·50	6·25
4 ...	6·2	5·33	5·28	5·47	4·59	6·5	4·51	6·25
5 ...	6·1	5·33	5·27	5·47	4·58	6·6	4·51	6·26
6 ...	6·0	5·34	5·26	5·48	4·58	6·6	4·51	6·27
7 ...	5·59	5·35	5·24	5·48	4·57	6·6	4·51	6·28
8 ...	5·58	5·35	5·23	5·49	4·57	6·7	4·51	6·29
9 ...	5·57	5·35	5·22	5·49	4·57	6·7	4·51	6·30
10 ...	5·56	5·36	5·22	5·50	4·56	6·8	4·51	6·31
11 ...	5·55	5·37	5·21	5·50	4·55	6·9	4·51	6·32
12 ...	5·53	5·37	5·21	5·50	4·55	6·9	4·51	6·32
13 ...	5·52	5·38	5·20	5·50	4·53	6·10	4·51	6·33
14 ...	5·51	5·38	5·19	5·50	4·53	6·10	4·51	6·33
15 ...	5·50	5·38	5·18	5·50	4·53	6·12	4·52	6·34
16 ...	5·48	5·38	5·17	5·52	4·53	6·13	4·52	6·34
17 ...	5·47	5·39	5·16	5·52	4·52	6·14	4·53	6·35
18 ...	5·46	5·40	5·15	5·52	4·51	6·15	4·53	6·35
19 ...	5·45	5·40	5·13	5·52	4·50	6·16	4·54	6·36
20 ...	5·44	5·40	5·13	5·53	4·50	6·17	4·54	6·37
21 ...	5·43	5·41	5·12	5·55	4·50	6·18	4·54	6·38
22 ...	5·42	5·42	5·11	5·56	4·50	6·18	4·54	6·38
23 ...	5·41	5·43	5·10	5·57	4·50	6·19	4·55	6·39
24 ...	5·40	5·43	5·9	5·57	4·50	6·20	4·55	6·39
25 ...	5·39	5·43	5·7	5·57	4·49	6·21	4·56	6·40
26 ...	5·37	5·43	5·6	5·58	4·49	6·21	4·57	6·41
27 ...	5·36	5·44	5·5	5·59	4·49	6·21	4·57	6·41
28 ...	5·35	5·45	5·4	6·0	4·49	6·21	4·57	6·41
29 ...	5·34	5·45	5·4	6·1	4·49	6·22	4·58	6·41
30 ...	5·33	5·45	5·3	6·1	4·49	6·23	4·59	6·41
31 ...	...	...	5·2	6·1	...	...	4·59	6·41

PHASES OF THE MOON.

		H.	M.
6 Sept.	○ Full Moon	12	19
14 „	☾ Last Quarter	1	13
20 „	● New Moon	16	39
28 „	☽ First Quarter	1	8
6 Oct.	○ Full Moon	3	23
13 „	☾ Last Quarter	7	56
20 „	● New Moon	3	30
27 „	☽ First Quarter	20	32
4 Nov.	○ Full Moon	17	27
11 „	☾ Last Quarter	14	45
18 „	● New Moon	17	10
26 „	☽ First Quarter	17	36
4 Dec.	○ Full Moon	6	12
10 „	☾ Last Quarter	22	53
18 „	● New Moon	9	25
26 „	☽ First Quarter	14	22

Statistics.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE TOTAL RAINFALL FOR EACH MONTH OF THE YEAR IN THE AGRICULTURAL DISTRICTS OF QUEENSLAND.

STATIONS.	1902.			1903.									
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.
North.													
Bowen	0·06	0·06	3·16	1·66	7·65	16·44	1·44	2·04	2·77	0·31	0·22	0·51	1·36
Cairns	0·16	1·38	5·15	21·32	10·28	32·51	15·50	1·67	0·51	0·87	0·44	0·47	0·91
Geraldton	0·29	0·44	5·53	38·94	17·24	45·00	14·03	7·46	3·42	2·07	7·08	3·79	3·05
Herberton	0·93	1·13	7·02	6·88	3·69	20·80	12·04	0·64	1·00	0·19	0·33	Nil.	0·67
Hughenden	0·05	0·22	2·77	1·52	0·99	0·95	0·81	1·73	Nil.	0·07	0·31	0·65	0·80
Kamerunga	0·29	1·57	3·79	20·36	10·82	37·45	19·32	2·14	0·50	1·10	1·50	0·86	1·39
Longreach	Nil.	1·27	1·56	1·81	0·09	3·48	Nil.	3·51	Nil.	0·69	Nil.	1·58	0·90
Lucinda	0·22	0·10	2·47	17·43	11·66	44·24	6·44	6·36	2·44	2·38	4·39	0·30	0·76
Mackay	0·17	0·35	7·71	10·45	6·47	13·51	1·50	6·75	2·49	2·53	0·59	0·44	1·54
Rockhampton	0·05	0·51	5·60	0·92	1·68	3·73	1·12	6·93	0·08	3·73	0·68	0·54	1·84
Townsville	0·29	0·08	6·50	4·66	8·11	19·80	1·61	2·08	1·02	0·05	0·19	0·44	2·42
South.													
Barcaldine	0·21	0·95	6·41	3·73	0·40	0·94	Nil.	4·92	Nil.	0·90	0·50	4·23	1·01
Beenleigh	2·92	3·36	1·83	1·88	4·77	6·49	1·90	12·40	0·92	5·04	2·26	4·13	3·29
Biggenden	2·34	0·25	8·98	2·25	3·15	3·95	0·16	1·28	2·07	3·90	1·62	2·23	2·77
Blackall	0·12	1·05	4 61	3·04	1·50	3·87	Nil.	5·19	Nil.	1·81	0·75	2·25	0·45
Brisbane	3·42	2·59	1·82	1·31	5·35	4·79	1·33	11·82	0·73	5·56	3·84	4·73	3·65
Bundaberg	1·24	0·65	1·38	0·97	2·60	6·05	0·38	11·55	0·33	5·98	0·88	3·55	0·43
Caboolture	2·30	3·17	1·74	5·15	3·42	9·59	1·39	16·14	0·92	6·08	3·27	4·41	3·11
Charleville	1·05	2·14	4·79	1·70	0·43	2·94	1·06	2·94	0·02	1·61	0·62	3·40	0·95
Dalby	3·14	2·79	3·29	1·28	1·22	4·89	1·33	6·00	0·03	3·78	2·30	3·30	3·12
Emerald	0·01	1·58	8·42	2·30	2·49	1·48	0·26	3·43	0·02	0·57	0·24	1·28	1·90
Esk	0·93	4·00	7·67	1·32	3·51	4·46	1·25	9·27	0·30	2·97	4·21	4·86	3·69
Gatton College	2·41	3·72	5·14	3·68	3·81	2·60	0·79	7·55	0·17	4·15	2·50	3·56	4·71
Gayndah	2·10	2·08	3·37	0·77	2·08	2·30	0·09	6·03	0·05	2·81	1·06	2·62	4·37
Gindie	Nil.	1·65	7·14	1·43	3·15	0·49	0·19	3·31	Nil.	0·51	0·30	1·58	1·97
Goondiwindi	1·50	0·89	2·21	1·84	0·72	4·40	1·73	5·07	0·15	4·38	2·09	4·22	2·16
Gympie	3·80	1·40	4·32	2·40	3·27	5·96	1·28	10·20	0·62	1·67	2·72	2·42	5·61
Ipswich	2·86	3·45	1·84	1·36	5·55	3·79	2·24	9·56	0·85	3·64	2·70	5·24	2·98
Laidley	2·21	3·27	5·13	0·71	3·63	2·63	0·95	8·20	0·20	4·65	3·06	4·25	5·47
Maryborough	0·91	1·11	4·02	2·09	2·76	3·23	0·66	9·58	1·60	6·17	1·09	1·93	2·62
Nambour	1·26	1·66	2·64	2·53	5·03	5·18	0·83	19·46	1·29	5·38	3·95	3·60	3·85
Nerang	3·15	1·75	1·73	3·36	4·73	4·84	3·04	15·75	2·36	7·34	2·21	3·81	3·52
Roma	0·92	0·86	2·35	0·75	0·15	2·48	0·39	3·17	0·34	2·26	1·13	6·61	1·92
Stanthorpe	2·29	3·98	1·75	0·23	1·59	0·95	1·18	6·87	0·74	4·71	1·98	6·07	3·45
Tambo	0·41	1·34	4·14	2·43	0·15	4·73	0·02	1·96	0·01	2·64	0·27	4·33	1·08
Taroom	0·68	1·40	2·88	4·32	1·53	1·29	0·82	8·83	0·23	3·83	2·21	1·51	2·05
Tewantin	1·94	1·96	1·35	1·90	5·30	11·52	1·80	20·22	7·42	7·09	5·70	5·80	2·85
Texas	2·42	1·67	1·42	0·18	0·94	0·48	1·84	4·34	0·36	4·53	3·21	4·55	2·47
Toowoomba	3·07	3·18	6·99	2·21	3·42	3·60	1·27	7·94	0·34	3·90	3·00	4·06	3·82
Warwick	2·96	2·87	4·61	0·68	2·59	2·13	0·73	8·62	0 10	5·45	2·63	3·41	2·89
Westbrook	3·20	3·34	3·37	4·21	2·70	1·52	0·34	4·23	2·53	3·89	1·63	3·89	4·03

EDGAR L. FOWLES,
For the Hydraulic Engineer.

PRICES IN BRITISH MARKETS OF ARTICLES WHICH CAN BE PRODUCED IN QUEENSLAND.

BUTTER.—Australian, 106s.; Danish, 115s.; New Zealand, 102s.; Canadian, 100s. per cwt.

CHEESE.—Canadian, 56s. per cwt.

CONNDESED MILK.—18s. 6d. to 20s. 6d. per case, in 20-case lots.

SUGAR (duties, raw, 2s. to 3s. 10d. per cwt.; refined, 4s. 2d. and $\frac{1}{4}$ per cent.).—Refined, £18 2s. 6d. to £18 15s.; raw, £12 to £18 per ton; German beet, 88 per cent., 8s. $5\frac{3}{4}$d. per cwt.

MOLASSES (duty, 2s. per cwt. and $\frac{1}{4}$ per cent.).—5s. 6d. to 8s. per cwt.

RICE (duty 5d. per lb.).—Rangoon, £9 10s. to £15; Japan, £14 to £17; Java, £20 to £26; Patna, £19 to £22 per ton.

COFFEE (in bond, duty $1\frac{1}{2}$d. per lb. and $\frac{1}{4}$ per cent.).—Ceylon plantation, 33s. to 90s. to 120s.; peaberry, 60s. to 123s.; Santos, 24s. to 47s.; Mocha, 60s. to 112s.; Jamaica, 90s. to 130s. per cwt.

CHICORY ROOT, dried (duty paid)—24s. to 27s. per cwt.

ARROWROOT.—St. Vincent, 2d. to $4\frac{1}{2}$d.; Natal, 6d. to 8d.; Bermuda, 1s. 3d. to 1s. 6d. per lb.

WHEAT.—Duluth, 36s. 6d. per 496 lb.; English, 31s. 6d. per 504 lb.; Australian, 31s. 3d. per 480 lb.

FLOUR.—30s. 6d. to 31s. per 280 lb.

MALTING BARLEY.—26s. to 36s. per 448 lb.; grinding, 23s. to 24s. 6d. per 416 lb.

OATS.—New Zealand, 23s. to 25s. per 384 lb.

SPLIT PEAS.—39s. 6d. to 40s. per 504 lb.

GINGER.—Jamaica, 55s. to 65s.; Cochin, 70s. to 80s.; Japan, 27s. to 29s. per cwt.

VANILLA.—3s. to 7s. per lb.

PEPPER.—Capsicums, 18s. to 75s.; chillies, 38s. to 45s. per cwt.; black, $5\frac{3}{8}$d. to $8\frac{1}{2}$d.; white, $9\frac{1}{4}$d. per lb.

GREEN FRUIT.—Apples, Australian, no quotation; Tasmanian, no quotation; bananas, 10s. to 14s. 8d. per bunch; pineapples, 3s. to 6s. each; oranges, Italian, 17s. per 420; lemons, Naples, finest, 30s to 31s. per 420.

DATES.—Tafilat, 45s. to 50s. per cwt.; Persian, 8s. 9d. to 14s. 6d. per case; Egyptian, 20s. to 35s. per cwt.

COTTON.—Uplands, $6\frac{1}{2}$d. to 7d. per lb.; West Indian Sea Island, $13\frac{1}{2}$d. per lb.; Queensland (Caravonica from Cairns), $8\frac{1}{2}$d. offered.

COTTON SEED.—£6 10s. per ton.

COTTON-SEED OIL CAKE.—£6 17s. 6d. per ton.

COTTON-SEED OIL.—Crude, 22s. per cwt.

LINSEED.—36s. to 46s. per 416 lb.

LINSEED OIL CAKE.—£6 12s. 6d. to £6 17s. 6d. per ton.

LINSEED OIL.—£19 to £19 10s. per ton.

OLIVE OIL.—£31 10s. to £33 per tun (252 gallons).

COPRA (cocoanut-kernel).—£15 to £16 per ton; £8 to £9 per ton at the S. S. Island trading stations. Corresponding value in Queensland, £10 to £12 per ton.

COCOANUT OIL.—£?0 to £32 per ton.

LUCERNE SEED.—56s. to 60s. per cwt.

MANILLA HEMP.—£25 to £30 per ton.

NEW ZEALAND HEMP.—£32 per ton.

SISAL HEMP.—£35 per ton.

FLAX.—£48 to £52 per ton.

TAPIOCA (duty, 5d. per cwt.).—12s. 6d. to 13s. per cwt.

Frozen Meat.—The following are the Frozen Meat Trade Association's Smithfield market quotations for the undermentioned classes of frozen meat, based on actual sales of not less than 100 carcasses of mutton or lamb, or 25 quarters of beef of fair average quality. These quotations are not for selected lines, but for parcels fairly representative of the bulk of the shipments now on the market:—

New Zealand Sheep.
(Crossbred Wethers and Maiden Ewes.)

	Nov. 14.	Nov. 21.
Canterbury, light (48 lb. to 56 lb.)	4d.	4d.
Canterbury, medium (56 lb. to 64 lb.)	4d.	4d.
Canterbury, heavy (64 lb. to 72 lb.)	4d.	4d.
Dunedin and Southland (56 lb. to 64 lb.)	$3\frac{5}{8}$d.	$3\frac{5}{8}$d.
North Island (55 lb. to 65 lb.) ...	$3\frac{9}{16}$d.	$3\frac{9}{16}$d.

Australian Sheep.
(Crossbred and Merino Wethers.)

Heavy (over 50 lb.)	$3\frac{1}{16}$d.	$3\frac{1}{16}$d.
Light (under 50 lb.)	$3\frac{1}{16}$d.	$3\frac{1}{16}$d.

River Plate Sheep.
(Crossbred and Merino Wethers.)

Heavy (over 50 lb.)	$3\frac{1}{16}$d.	$3\frac{1}{16}$d.
Light (under 50 lb.)	$3\frac{1}{16}$d.	$3\frac{1}{16}$d.

New Zealand Lambs.

Canterbury, light (28 lb. to 36 lb.)	$4\frac{3}{4}$d.	$4\frac{3}{4}$d.
Canterbury, heavy (36 lb. to 42 lb.)	$4\frac{3}{4}$d.	$4\frac{3}{4}$d.
Dunedin and Southland (28 lb. to 42 lb.)	$4\frac{5}{8}$d.	$4\frac{9}{16}$d.
North Island (28 lb. to 42 lb.) ...	$4\frac{1}{2}$d.	$4\frac{1}{2}$d.

Australian Lambs.

30 lb. to 40 lb. ... ... None offering.

River Plate Lambs.

30 lb. to 40 lb. ... ... None offering.

New Zealand Frozen Beef.

Ox, fores (180 lb. to 220 lb.) ...	$2\frac{3}{8}$d.	$2\frac{3}{8}$d.
Ox, hinds (180 lb. to 220 lb.) ...	$3\frac{1}{2}$d.	$3\frac{3}{8}$d.

Australian Frozen Beef.

Ox, fores (160 lb. to 200 lb.) ... None offering.
Ox, hinds (160 lb. to 200 lb.) ... None offering.

River Plate Frozen Beef.

Ox, fores (160 lb. to 220 lb.) ...	2d.	$2\frac{1}{8}$d.
Ox, hinds (160 lb. to 220 lb.) ...	3d.	3d.

(All quotations for beef are nominal.)

Eggs.—French, 11s. to 12s. 6d.; Danish, 9s. 6d. to 10s. 10d. per 120.

Bacon.—Irish, 60s. to 66s.; American, 54s. to 57s.; Canadian, 59s. to 61s. per cwt.

Hams.—Irish, 84s. to 98s.; American, 60s. to 84s. per cwt.

Tallow.—Mutton, fine, 28s. 6d.; medium, 26s. per cwt.; beef, fine, 28s. 6d.; medium, 26s. 3d. per cwt.

General Notes.

SNAKE BITES.

As the hot season is close upon us, snakes will once more make their unwelcome appearance, and, therefore, it would be well for all persons whose occupations or amusements take them into the bush, or into the neighbourhood of swamps, to gain some knowledge of their appearance and mode of attack. Many people bitten by snakes undergo painful operations, such as cutting out a piece of flesh, burning with gunpowder, swallowing ammonia and ardent spirits, &c., under the impression that the snake which bit them must necessarily be venomous, when a slight knowledge of the arrangement of the teeth and fangs of venomous and harmless snakes would have saved them much pain and anguish of mind.

The great authority on Australian snakes, Dr. Krefft, says that the bite of a non-venomous snake shows tooth-marks thus— ⋮ ⋮ whereas venomous snakes leave only two punctures, thus— . . or possibly three or four, thus— ⁚ · ⁚

The venomous snake does not *bite.* He *strikes* and immediately withdraws. A carpet snake, for instance, when biting, hangs on, and even shakes his victim, whilst a brown snake, of whose attack we also have some experience, only inflicts a wound in the shape of a blow. Many people are afraid of water snakes. The true *fresh* water snake, ugly though he appears, is quite harmless, whilst the sea snakes are all poisonous. There is, of course, some difficulty in deciding, when meeting a snake swimming in fresh water, whether it is a true water snake or merely a land snake taking a bath or crossing a creek or lagoon. All marine water snakes exhibit a tail formation different to that of land snakes, and can be at once determined. Few of the tree snakes are venomous. Indeed, the number of venomous snakes in Queensland is small in comparison to the number of varieties. There is a simple means of deciding whether a snake is venomous or not, and that is by the labial scales. In the dangerous species, the number of scales on the lip is eight, whilst more than eight are seen in non-venomous snakes, such as the carpet snake, green snake. Even the most deadly species are not so dangerous as those of India and of Southern and Central America, or as the rattlesnake of North America, the venom fangs of the former being shorter than those of the latter.

People talk of snakes *stinging*. Snakes never sting, Nature not having provided them with any apparatus for the purpose. The *sting*, so called by uneducated people, is the tongue. This member is forked, and serves the same purpose as the antennæ of a cockroach or butterfly. It receives the vibrations of the air, and it serves to warn the snake of the presence of a possible enemy. Being destitute of ears, snakes employ this method of self-protection. The sole weapon of offence in a venomous snake is the fang, which is movable. It is not, as many suppose, hollow or perforated from root to tip, but is grooved. The base of the fang rests upon a poison gland. When not in use for aggressive purposes it lies flat on the gum, and is only erected when the reptile is excited and on his defence. The instant the blow is made, the poison bag is compressed, and the venom runs down the channel in the fang into the wound. A thick woollen stocking will often prevent serious effects by absorbing the poison as it passes down the channel. Many of the inocuous snakes destroy their enemies or kill their prey by means of constriction. The constrictive powers of snakes of the boa and python species are enormous. A 10-feet long carpet snake has power to crush the life out of a human being. Such a snake seized by the neck and tail simultaneously is rendered harmless, as the tail is said to be requisite for aiding the constrictive operations. All Australian land snakes, except the death (or deaf) adder, are good climbers. A black snake will climb the smooth surface of a gum-tree with ease. When an attempt is made to draw a large snake from a hollow log by the tail, the attempt is almost sure to fail, as the snake opens its scales and so offers strong resistance to its would-be captors.

The death adder has, near the end of the tail, a peculiar hooked appendage, of which scientific men have not yet been able to decide the use. It is too soft to enable it to penetrate anything. It is not hollow, and contains no poison. Its functions are as much a mystery as the curl in the tuft of a lion's tail. When bitten by a snake the victim should, if possible, keep calm and kill the reptile. On examination it will often be found that there is no cause for alarm, and hence no need for violent remedies. When killing a snake, the attack on the reptile should always be from the front, for a snake will often throw itself backward with greater violence than is exerted in its forward spring.

Should, however, the snake prove to be venomous, a ligature of a strip of linen, of greenhide or cord, should be at once applied above the wound, which should be scarified with a knife, to cause profuse bleeding. If no other remedy is at hand, the person bitten should keep in motion and resist all inclination to lie down. Spirits—either alcohol or ammonia—should be freely administered, if procurable. The bite of a black, brown, or even diamond or tiger snake is not necessarily fatal, much depending upon the clothing worn by the victim at the time, and upon the direction and locality of the bite.

The bite of the death adder is, however, said to be usually attended with fatal consequences, although, even in this event, many cases of recovery are reported where prompt remedies have been applied.

Carpet snakes, although harmless to human beings, who often make pets of them, are a source of great trouble to poultry-keepers. They often attack the fowl-roosts at night, and destroy eggs, chickens, and grown fowls. They are, on the other hand, excellent ratters, and thus are useful in the barn. They are far superior to cats in this way, as they can follow the rats to their hidden nests, and they do not assemble on the roof at midnight and loudly proclaim their connubial bliss to the sleeping world. They are not in the least a source of danger in the house. The writer once slept all night in a small room 6 feet broad by 8 feet long in company with a large carpet snake. On entering the room a peculiar smell was observed, and this led to a search for a snake. There is a distinct odour exhaled from the breath or else exuded from the body of a snake, which, in a confined space, betrays its presence. On the occasion now mentioned, this odour, being recognised, led to a search which was fruitless, and it was concluded that if a snake had been in the room he had been warned that it would be healthier for him to seek outside quarters. Next morning, however, there was his snakeship comfortably coiled up on a heap of bags in one corner. The only wonder is that it did not seek the warmth of the blanket during the night. The reptile was about 7 feet long and nearly 9 inches in circumference. It now is located in a large glass case in the hall of a house in London—stuffed, of course.

There is a lamentable amount of ignorance of snakes and their habits, even amongst old bushmen, timber-getters, fishermen, &c., and ludicrous beliefs exist in consequence regarding the methods of attack adopted by the reptiles. Here is one. There is on the South Coast lands of Queensland a ringed snake, the marks on its body being alternate black and white rings. Under the name of "hoop snake," this animal is supposed to take its horny pointed tail in its mouth, and start for its enemy or for its prey in the form of a boy's hoop or a bicycle wheel. On arriving within striking distance, it lets go the tail, straightens itself out, and flies *tail first* at the enemy, inflicting a mortal sting. We were solemnly informed by one man that he had seen the snake miss his game and strike a gum-tree. The tail penetrated the thick bark, and there the snake would have had to remain till it starved to death had not our informant killed it! As a matter of fact, this snake is perfectly harmless, not even attempting to bite when handled. Mr. Meston states that a variety of ringed snake is very venomous.

In this connection we shall be glad to receive an account of any *authenticated* adventures with Australian snakes, for publication elsewhere than in Queensland.

To show how much education in this respect is needed, the present Comptroller of Prisons, Captain Pennefather, was bitten at Sweer's Island, in the Gulf of Carpentaria, by a snake which was reputed to be deadly. He, however, understanding the difference between the venomous and innocuous varieties, took no heed of the bite, and no evil effects followed.

On the other hand, we have seen a kind of large black snake from the Bellenden-Ker Mountain, which was said to have killed a member of an exploring party. The man died, but the snake, when brought to Brisbane, was proved to be perfectly harmless. Fear and spirits wrought the evil in this case. The moral is: Examine the wound, examine the labial scales of the snake if it has been killed, and it will often be found that no remedies are required beyond, perhaps, a glass of spirits, to keep up the spirits and allay the unfounded fear of the wounded person.

TREATMENT OF SNAKE BITE.

Although cases of snake bite are not very frequent in the State—notwithstanding the fact that some localities, especially in the neighbourhood of swamps, are infested by several species of venomous snakes—yet all bush workers, plantation and farm hands, swagmen, and others who are in the habit of camping out, are liable to tread unawares on one of the reptiles and receive a dangerous bite; and this may happen at a distance from medical assistance. We therefore publish the following directions for the immediate treatment of snake bite, by Dr. J. Ashburton Thompson, Chief Medical Officer of the Government Health Department, New South Wales: —

Directions.

A ligature—that is, a strong string tape, narrow strip of clothing, or handkerchief—should be tied at once round the limb *above* the bitten part. When it has been tied, pass a piece of stick under it, and twist it round and round so as to screw up the ligature as tightly as you can. Leave the stick in the twisted ligature, and secure the end by another string around the arm above the ligature. Great pain and swelling are caused by this, but cannot be avoided.

At the end of half an hour undo the ligature for 5 minutes; then tie and screw up again. At the end of another half hour the ligature may be removed altogether.

In places where a ligature cannot be tied, as on the neck or face, pinch up the bitten part between the finger and thumb, and cut it out.

In any case the bitten part should be cut into by numerous little cuts over and around the bite, for about $1\frac{1}{2}$ inches round, and sucked by the mouth freely and perseveringly; and this can be done without danger by any person.

Stimulants, such as brandy, whisky, gin, rum, in small quantities at a time (a few teaspoonfuls), or strong tea or coffee, or wine, may be given if the patient be faint.

We would draw particular attention to the second paragraph in the above directions, which directs the ligature to be removed in half an hour and afterwards replaced.

A case occurred a little while ago in Queensland which demonstrated in a fatal manner the necessity for relaxing the ligature. A person came in from the bush to be treated for snake bite by a doctor. If we recollect rightly, the patient had doctored himself properly in so far as scarifying and sucking the wound and applying a tourniquet; but, unfortunately, he had kept it on for some hours, and mortification had set in. Amputation of the arm was resorted to, but the patient died.

Stimulants are often given to excess with dire effects, and it is not outside the experience of medical men that sufferers from snake bite are really often sufferers from overdoses of spirits, having been bitten by some non-venomous snake, and would have recovered without any stimulant. We would strongly urge upon all teachers and parents to get some good work on Australian snakes, and instruct their pupils and children in the method of determining whether a snake is poisonous or not. This might save many a finger, and possibly many a life, for there are nervous people who are prone to collapse even at the sight of a snake. Many well-educated people, and most children, believe lizards—including the jew lizard and so-called iguana and frilled lizard—to be venomous; when, as a matter of fact, we believe there is only one known species of venomous lizard in the world.

SNAKE-BITE CURES.

Professor Martin, late of the Melbourne University, who has recently been appointed Director of the new Lister School of Preventive Medicine in London, before leaving Melbourne delivered a lecture embodying the results of several years' researches into Australian snake poisons. The result is somewhat disappointing, but should be generally known, as it does away with many remedies that have been widely believed in, and points out what can actually be done. For all snakes except the death adder, the only remedy that is of the slightest use is what he calls the ligature, applied immediately.

If the bite be on the tip of the finger, the ligature may be tied round the base of the finger, if done instantly. If not, we must go higher. It is no use tying anything round the wrist or forearm, nor round the leg below the knee, for in these places the limb consists of two bones, and the circulation cannot be stopped by a band of any sort. We must go above the elbow or above the knee, where there is only a single bone. The ligature must be tied as tight as possible—twisted tight with a stick—for no blood must pass. In half an hour's time the ligature may be removed.

All the usual remedies, such as ammonia, strychnine, and chloride of lime injections, whisky, and exercise, are powerless to check the clotting of blood caused by all Australian snake poisons, except the death adder. Cutting out the piece and gashing the limb to make it bleed is equally futile. Anti-venomous serum is a remedy, but hardly a practical one, as you must apply the right antidote to the right snake. The poisons of different snakes vary, and it would be useless to inject tiger snake anti-venom for the bite of a brown or black snake. It is disappointing to learn that so many reputed cures are useless, and probably a great many people will continue to try them, but Professor Martin is a strictly scientific man, whose conclusion no scientific man would think of doubting when he speaks absolutely, as in this case.

FLYING FOXES.

The *Farmer and Grazier* says:—During the past season the ravages of flying foxes on orchards on the coast and tablelands have been most destructive. They seem to be increasing rather than decreasing in numbers. A farmer on the south coast tried a preventive that he had either heard of or read about. He gave it a trial, and found it to be effective. Not a fox visited his orchard during the last season. If they did, no damage was done or trace left of their visit. He procured long strips of calico, or other strong cotton cloth, dipped them in hot melted sulphur, and tied several to the branches of each tree. Owners of fruit trees should give the cheap and simple remedy a trial.

PRICKLY PEAR DESTROYER.

We have been shown by Mr. J. C. Watson, of Spring Hill, a number of prickly pear plants and large roots which had been completely killed by inoculation with a certain fluid chemical, the composition of which he, of course, withholds. It appears that two chemicals are employed, one which destroys the leaves, by spraying, within two weeks, and the other is afterwards injected into the stumps, and has the effect of completely drying them up. One lot we saw was sprayed on 29th June, and, notwithstanding the wet weather, leaves and roots were dried up to a light fibre by 18th September. Another root was dug up a fortnight after spraying, and was quite dry and hollow. Mr. Watson says that the liquid can be manufactured very cheaply. We should be better able to pronounce an opinion on the value of his discovery if he were in a position to operate on a large area of prickly pear.

USEFUL HINTS.

Mr. J. Hull, of Cressbrook Farm, Herberton, in acknowledging the high value he sets upon the information he gains from the *Journal*, wishes it to be recorded that he wrote to the Department of Agriculture, a few months ago, asking advice as to how to treat a pure Berkshire sow that would not breed. The matter was referred to Mr. H. C. Quinnell, Veterinary Surgeon to the Department, who prescribed treatment which resulted in the sow producing a litter of nine young pigs. Mr. Hull then sends us a recipe.

To Harden a Young Horse's Shoulders against Collar Galls.

Probably many people wash them after work with salt and water, which is very good. But a plan twice as good is the following:—With a tomahawk get a few pieces of wattle-bark, chop them up, and put in an old saucepan or billy with water, and boil, say, for an hour; then take off the fire, and at the same time throw in a handful of common salt. When fairly cool, throw out the bark and put the liquor into two or three bottles ready for use. When taking off collar or saddle after work, wash with this, which hardens the skin.

I was one time running a milk cart with a young mare just broken, and after two or three days—the roads being bad and the weather very wet—she had a piece of skin the size of half a crown off the point of each shoulder. I was in despair, having no other horse at hand, and, having just started the business, I was obliged to go on. However, I was told of this cure, and used it, with the result that, though I kept on using the mare every day, in a few days the sores were tanned, and never got sore again in six months' continual work. This cure is only useful to horses working, not spelling. It is also good for sore backs, and with young horses to harden their backs. An ounce of prevention is better than a pound of cure.

Value of Bloodwood Gum.

On this subject, Mr. Hull says:—It may not be generally known that bloodwood gum, picked off the sides of bloodwood-trees, is one of the most valuable remedies for a dozen different ailments. If the gum is wet when found, it should be dried in the sun, then pounded up fine, and be kept in a tin for use. It is harmless, yet so strong it will cut away proud flesh from a wound. It will heal a fistula, if taken in time, and, though this is a big statement, I know of well-authenticated instances. It will take away all smell from a foul and stinking wound in two hours. It will cure scour in calves in one or at most two doses. Take as much, powdered, as will lie in the palm of the hand, and when about to give calf milk—if hand-fed, or about to suck if on the mother—hold his head up and open his mouth, and throw it down his throat; some will, no doubt, be spilt, but enough will go down to effect a cure.

Rearing Calves on Skim Milk.

I might add, to interest other dairymen, that I have proved the statement frequently made in papers that calves cannot be reared on skim milk alone to be nonsense, as I have done it successfully for some years. But one thing is necessary—that is, good grassed pasture to run on. We give them the mother's milk for ten days; then change gradually to skim; at, say, six or eight weeks all skim milk, when they get miserable for a week or so, then soon recover; and from this out nothing but skim milk (separated with separator), and I am never ashamed to show my calves to anyone; in fact, they look better than many that run with their mothers with my neighbours.

CURING WARTS ON COWS' TEATS.

The best and simplest remedy is pine tar (Stockholm tar), and it will cure every time. It is best to use it when the cows are dry. Just put it on the warts, and in a short time they will come off; one or two applications in most cases are all that are necessary.

DUST SPRAYING.

Dust spraying has come greatly into favour of late in the United States, and many who have tried it prefer it to liquid spraying. The various insecticides used commonly in liquid form are all applied in a cloud of dust, dispersed by a machine constructed for the purpose. The worker, it is said, with the wind in his favour, can envelop a whole fruit plantation in dust with much less labour than he has to apply when he uses liquid spray, and a similar claim is made for dust-spraying potatoes and other field crops. There is no carting of water, nor is there any trouble with clogged nozzles, while the mixing of the ingredients of an insecticide is much easier when powder is used. Moreover, it is said that the dust does not burn the foliage, as liquid often does, and that an excess of the former does not harm. The worst of the plan is that it must be carried out when the foliage is damp with dew or rain.

SALT AS A PREVENTIVE OF SORE SHOULDERS.

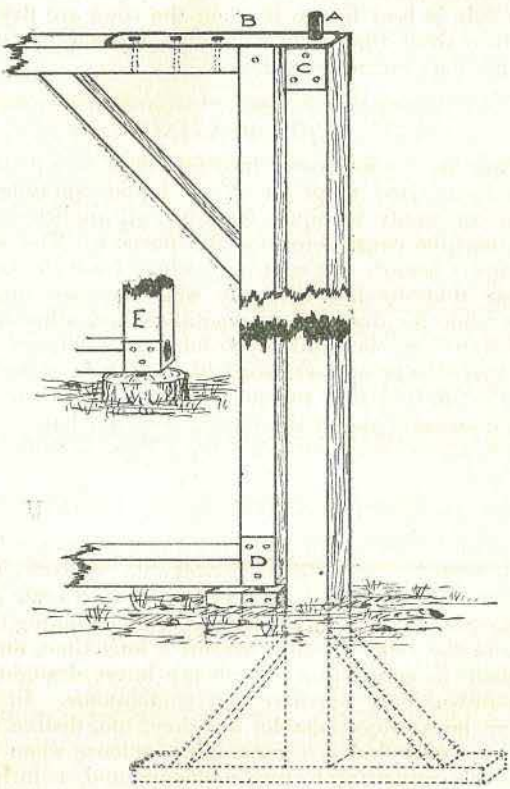
There is nothing much more annoying than to have a horse of any kind with sore shoulders. It makes them inacapable of work, and few ailments take longer to cure. If the horse is a young one—and some get sore shoulders when being broken in—there is great danger of its becoming a jibber. It makes horses very shy of the collar in any case for a long time, and they sometimes come to a standstill in going up a hill when a heavy draught is not the cause. It makes them provokingly sensitive and troublesome. In the case of older horses it may not be so objectionable, but they, too, dislike it greatly. Those with one trap horse only find it a great inconvenience when it is unable to go out for weeks in the trap owing to sore shoulders, and, as farm horses generally have such at the time work is at its height, the whole thing is a great hindrance. A bad-fitting collar is usually the cause, and a collar too large does it sooner than one that is a little too small. Deficient padding will also cause it, and one way to avoid such injury is to be particular as to the collar fitting properly. But some horses will have sore shoulders though the collar be all right, as the skin may be tender naturally, and a little rubbing of the collar will make it more so or induce sores. And in every case wherever anything of the kind is likely to occur, anticipate it and apply a preventive. The result of this will be most gratifying, and the best antidote is a liberal use of salt water to the neck or part where the collar rests. If 1 lb. of salt is dissolved in one pint of water, and the shoulders soaked often with the liquid, the skin will become hard and tough, and there will be little or no danger of any sores arising. The remedy is cheap and simple, and most efficacious; only be sure and use it as a preventive.

VALUE OF COWDUNG.

Professor Dr. Wolff, of Hohenheim, found in 2,000 lb. of fresh cowdung 6.8 lb. nitrogen, 3.2 lb. phosphoric acid, and 8 lb. potash. This would give, in 33 loads of 3,000 lb. each (99,000 lb.), 336.6 lb. of nitrogen, 154.4 lb. phosphoric acid, and 396.0 lb. potash.

A GOOD BUSH GATE.

A Victorian correspondent, Mr. A. C. Neale, sends us a very good idea of a gate to take the place of slip-rails, copied from a bush gate in Gippsland. A gate on this plan has been placed in the fence of a Government reserve near Melbourne, and has proved strong and lasting. It stands a good strain, and never sags or drops, if the supporting post has been firmly fixed.



The original of this gate was a crude gate of slip-panels joined together, but the points and sockets were of wood, and answered very well.

A. Iron pin joined to cap C.
B. Iron plate hung on pin.
C. Cap screwed on to post.
D. Iron pin joined to cap, similar to C, or, as at E, inserted in a "capped" red-gum post or stump.

EXPERIMENT WITH FRUIT TREES—OATS—PROTECTING SUGAR-CANE FROM FROST.

A reader of the *Journal*, living at Petrie's Creek, has revived the old idea of driving nails into the trunks of fruit trees to keep them healthy and free from pests. It was at one time an article of faith with some fruit-growers that if copper nails were driven into a tree the sap would be so impregnated with copper salts that, whilst neither the tree, blossom or fruit would be injured, the poisoned sap would destroy all scale and fungus pests. Our correspondent says that, having read of this method in a Sydney journal, he operated on a plum-tree nine years old which had never borne fruit. He drove in some nails (whether copper or iron is not stated) too late in the season, but repeated the process in the following year. The tree, a wild goose plum, is now bearing well. Other kinds of trees treated in like manner are also said to be bearing heavy crops.

With regard to oats, he planted two varieties; one was badly affected by rust which ruined the crop (name of variety not given). Of Algerian oats, he has a splendid crop over 6 feet high, free from rust, and standing up well. These and other crops, such as maize, lucerne, and sugar-cane, have been grown on his farm on the creek for years without requiring manure. Of sugar-cane he has 20 acres of seventeen different varieties. He and his neighbours smoke the cane to keep off frost with great success. Whilst some neighbouring fields of cane were badly frosted, theirs remained perfectly green. They rose at 4 a.m., and kept up a smoke from fires of rubbish mixed with tar until after sunrise, with the result that none of the cane was touched by frost. The cost was a mere trifle, and the gain very considerable.

VEGETABLE MARROW JAM.

Pare and take out the seeds, slice small. To each 1 lb. of fruit allow ½ lb sugar and the juice and rind of a lemon; lay the marrow and sugar on a dish over night; add a little ginger; boil for three hours slowly.

If lemons are not procurable, acid answers very well if put into the jar while hot; it helps to keep the jam longer.

Pie melons treated in the same way make excellent jam.

AGRICULTURAL AND HORTICULTURAL SHOWS.

The Editor will be glad if the secretaries of Agricultural and other Societies will, as early as possible after the fixture of their respective shows, notify him of the date, and also of any change in date which may have been decided on.

Answers to Correspondents.

DEW-RETTING FLAX.

INQUIRER, Beaudesert.—Your doubts about the efficacy of dew-retting instead of soaking the flax plant are unfounded. Messrs. Woolff Bros., of Traralgon, Gippsland, have satisfactorily demonstrated that by spreading the flax out on the grass (this is what is meant by dew-retting) the rough husk is more effectively and less expensively removed than by the slow old process of soaking in a stream. The remarkable thing about dew-retting is that, whilst our climate is just the one to assist the process, the European climate prevents the adoption of dew-retting.

FELLING SCRUB NEAR A CANEFIELD.

A. B., Ripple Vale.—We are not aware of any law on the subject. If your neighbour were to fell his scrub after you had fenced and planted your cane, common sense should tell him that he should leave a chain of scrub standing between you and his fallen scrub. If he has not done so, and in burning off fires your cane, you have a remedy at law. As to planting cane near the boundary, if you know that your neighbour is going to fell his scrub, you should have an understanding with him about leaving a strip of standing scrub, or else you should not plant until he has burnt off. There is a case in point at Mapleton, where a block of 150 acres of scrub has just been felled. This block adjoins several established orchards. The owner has left over a chain of scrub standing, to avoid damaging the orchards when he burns off. The orchardists, being satisfied with the arrangement, will not become involved in any lawsuit in case of unforeseen accident.

MEAD.

Most recipes for making mead recommend the use of spices. Spices should not be used, as they destroy the taste of the honey. The simplest recipe we know of is the following:—

Soak the cappings, or pieces of comb, after extracting, in water, and when they have yielded up their sweetness drain the water away and test it to ascertain the quantity of honey it contains. The proper strength will be found to allow an egg to float, and to remain about half submerged. If there is too much honey, add water; if too little, add honey. When there is a fairly large quantity of liquid, it is somewhat difficult to make an accurate test. In that case take out a quart of the liquid, and add honey or water proportionately, as shown by the test. When the proper degree of strength has been obtained in the manner described, boil the liquor for twenty minutes, skimming all the time. Then pour it into a pan, and let it remain till next day; then pour it into a cask and leave it. Slight fermentation will take place. When that is over bung tightly, and leave the barrel unmolested for six or twelve months.

STORING MANGOLDS.

NOVICE, BALD HILLS.—Your question has been referred to the Agricultural Adviser, who gives it as his opinion that mangolds will not stand pitting like sweet potatoes. The best way is to leave them in the ground as long as possible. Of course, they will, in time go to seed if so left, but no other way of keeping them has, as yet, come under our notice.

WARTS ON FOWLS.

A. A. J., Yaamba.—

Remedies for warts on fowls were given in the *Journal*, Vol. VI., pp. 23, 233, as follows :—Avoid giving heating food, such as oatmeal and maize, in large quantities. Twice a week dissolve a small quantity of Epsom salts in their drinking water—say in the proportion of one packet to 1 gallon of water. Continue this to the end of February. Give plenty of green food. Do not allow large numbers of chickens to huddle up together in fowl-houses. Warts are infectious; therefore separate those attacked, and rub carbolic oil or a mixture of lard and bluestone over the sores, and bathe the eyes in warm water. This will prevent their closing, and save the chickens from death by starvation.

Another way is to scrape off the skin of the wart and carefully bathe the raw surface with hydrogen peroxide and water in equal parts. Dry and apply carbolated vaseline (1 per cent. of carbolic is strong enough). We ourselves saved three well-grown Wyandotte chickens in this way. The warts were lifted clean off with a pen-knife, the raw parts dressed, and in a short time the fowls were quite well.

Still another excellent remedy is to dip the head of the chicken twice a day in fresh urine. A poultry expert gave us this as a secret. We tried it, and completely cured thirteen half-grown buff cochins.

The best remedy for lice on poultry is the dust bath. We never are troubled with lice, as we take care to keep deep dust baths for our poultry.

Thanks for the recipe for vegetable marrow jam.

BROOM MILLET.

A. B., Mondure Scrub.—Any land and climate suitable for maize will also suit broom millet. Rain discolours the broom and reduces its value; therefore it is advisable to plant in September, and harvest the crop before the usual wet season sets in; or late, say at end of December or early in January, so as to have the crop come into ear at the end of the wet season. If the land is good, plant not less than 3½ feet between the rows, and thin out to four or five plants to the foot in the rows. Four quarts to the acre is sufficient seed, and, if it be perfectly sound, sow as sparingly as possible to avoid thinning. When the ear is three parts filled, bend the stalk, a foot or so under the ear, over your arm so that it may hang straight, and harvest before the grain hardens or before the ear has lost its green tinge. Three pence per pound has been frequently paid for first-class broom. Eight to 10 cwt. of broom per acre and from 25 bushels upwards of seed is a good yield; the seed makes good feed for fowls and pigs. In curing the broom and ripening the seed, it should be laid thinly in an open shed to preserve the colour. A few inches of stalk should be left to each ear when harvesting. Seed is plentiful, and can be procured from all seedsmen or growers of broom.

POTATO SPRAYER—NEPAUL BARLEY.

F. Parr, Carrara—

1. The sprayer described in the *Journal* in 1897 is the "Strawsoniser." The only one we know of in this State was imported by the Department of Agriculture. Mr. McLean, Agricultural Adviser, says that any good knapsack sprayer will be as effective as the Strawson sprayer. You would have to import the latter from England.

2. Nepaul or skinless barley will no doubt be easily procurable after the present harvest. The State Farms at Westbrook and Hermitage should be applied to for seed and instructions as to sowing. The quantity to sow per acre will depend greatly on the richness of the soil. Generally speaking, if drilled, 30 lb. of seed are sufficient if sown broadcast, 40 lb.

A BALANCED RATION FOR COWS IN MILK.

C. V. H., CAIRNS.—

Green maize requires no additional food as a ration for milk cows; the same may be said of green lucerne.

Crushed maize (steamed), mixed with cane tops, about 4 to 5 lb. per day, is a good ration for cows in milk.

Bean meal, in the same proportion, will also be found suitable.

Sunlight oil cake is one of the cheapest foods in the way of oil cakes.

UTILISING OLIVES—DRYING FIGS.

J. REVIE, CHILDERS.—

Mr. A. H. Benson furnishes the following replies to your questions:—

1. Olives only pay to grow when there is a large enough production in the district to warrant the establishment of an oil mill. There is no sale for fresh olives in this State, as oil production has never been attempted in other than a purely experimental manner. If the olives are of large size, they will pay to pickle; the method of doing this has been described in the *Agricultural Journal*, (Vol. VI., p. 113, 1900).

As to utilising the White Adriatic figs from a few trees, I cannot recommend anything better than turning them into jam, as good fig jam always meets with a ready sale. Even did our climatic conditions enable us to produce a good drying fig, which they do not, at any rate in the Isis, it would not pay to dry such a small quantity.

DISEASE IN ENGLISH POTATOES, BORER IN SWEET POTATOES.

BRISTOLIAN.—Mr. Hy. Tryon, Entomologist and Vegetable Pathologist, furnishes the following replies to your Questions 1 and 2:—

Question 1.—Has any remedy been discovered for the disease in the English potato in which the haulms wither about the time of flowering or earlier, the stem rots, and also the young tubers?

Answer 1.—No direct remedy, but an effectual method of preventive treatment. See the article "Potato Disease," by the Government Entomologist, in Vol. V. of the *Journal*, pages 55 to 63.

Question 2.—Is there any remedy for the borer or worm in sweet potato?

Answer 2.—The remarks under Answer 1 are applicable in this case also. See the article "The Sweet Potato Weevil," by the Government Entomologist, in Vol. VII. of the *Journal*, pages 176-189 .

Answer 3.—For poisoning bandicoots, kangaroo rats, opossums, &c., try cyanide of potash mixed in pollard, and add a little oil of aniseed or oil of rhodium.

LADYBIRDS.

A.R., Mount Britton—

Question.—I enclose herewith specimens of a ladybird abounding in my garden, especially on figs, oranges, and grape vines. Will you kindly say if it be a useful species or a prejudicial one?

Answer.—The insects submitted are examples of *Verania grenata*, Erickson, one of the useful members of the ladybird family of beetles. In common with representatives of other kinds of this important group, it sometimes occurs locally in large numbers.—(*H.T.*)

The Markets.

AVERAGE PRICES FOR FRUIT—ROMA-STREET MARKETS.

Article.	OCTOBER. Top Prices.
Apples, Eating, per case ...	12s.
Apples, Cooking ,, ...	10s.
Apples, American, Eating...	15s.
Apples, American, Green ...	14s. 6d.
Lemons, Italian, per 360 ...	...
Lemons, Italian, per 180 ...	...
Lemons, American, per 180	...
Lemons, New South Wales, per case	6s. 6d.
Oranges, Italian ,,	...
Oranges, Local ,,	8s.
Oranges, Sydney (packers) ,,	8s.
Mandarins, Local (indifferent) ,,	5s.
Mandarins, Sydney (packers) ,,	8s.
Apricots, New South Wales, boxes (half-gincase)	...
Apricots, Queensland, half-case ...	...
Plums, half-gincase, American (80, 96, 108 in box), per box ...	6s. 6d. to 7s. 6d.
Peaches, quarter-case, local	3s. 6d.
Peaches, quarter-case, American (48 and 56 in box), per box ...	8s. 6d. to 9s.
Nectarines, half-gincase ...	...
Cherries ...	...
Passion Fruit, quarter-case	4s. 6d.
Mangoes ...	10s.
Pineapples, rough, per dozen	4s.
Pineapples, Queen ,,	6s. 6d.
Melons ...	...
Rockmelons, Northern ...	...
Bananas, Local, per bunch	8d.
Bananas, per dozen ...	2½d.
Tomatoes, quarter-case ...	3s. 6d.
Papaw Apples, quarter-case	1s. 6d.
Custard Apples, quarter-case	...
Granadillas, case ...	7s. 6d.
Seville Oranges, apple-case	3s.
Cape Gooseberries, per quart	3d.
Pears Tasmanian, quarter-case ...	...
Pears, American (70 and 80 in box), per box ...	7s. to 8s.
Rosellas, per sugar-bag ...	...

AVERAGE TOP PRICES FOR OCTOBER.

Article.		OCTOBER. Top Prices. £ s. d.
Bacon ...	lb.	0 0 8½
Bran ...	ton	3 5 0
Butter, First ...	lb.	0 0 10
Butter, Second ...	,,	0 0 7½
Chaff, Mixed ...	ton	3 2 6

AVERAGE TOP PRICES FOR OCTOBER—*continued.*

Article.		OCTOBER. Top Prices.
		£ s. d.
Chaff, Oaten	ton	5 3 9
Chaff, Lucerne	,,	2 16 3
Chaff, Wheaten	,,	3 11 10½
Cheese	lb.	0 0 6⅝
Flour	ton	12 10 0
Hay, Oaten	,,	6 3 9
Hay, Lucerne	,,	1 17 6
Honey	lb.	0 0 1¾
Rice, Japan (Duty paid)	ton	21 0 0
Maize	bush.	0 3 1
Oats	,,	0 3 9
Pollard	ton	4 1 10½
Potatoes	,,	6 8 9
Potatoes, Sweet	,,	1 15 0
Pumpkins	,,	1 10 0
Sugar, White	,,	20 10 0
Sugar, Yellow	,,	17 10 0
Sugar, Ration	,,	15 10 0
Wheat	bush.	0 5 9
Onions	cwt.	0 4 6
Hams	lb.	...
Eggs	doz.	0 0 8½
Fowls	pair	0 4 3¼
Geese	,,	0 6 7½
Ducks, English	,,	0 4 9¼
Ducks, Muscovy	,,	0 5 9½
Turkeys, Hens	,,	0 9 4¾
Turkeys, Gobblers	,,	0 16 8¼

ENOGGERA SALES.

Article.	OCTOBER. Top Prices.
	£ s. d.
Bullocks	11 3 1½
Cows	7 15 7½
Wethers, Merino	1 1 9
Ewes, Merino	...
Wethers, C.B.	1 1 5¼
Ewes, C.B.	0 14 9
Lambs	0 17 9¾
Pigs	...

Orchard Notes for December.

By ALBERT H. BENSON.

In the Orchard Notes for November, I called special attention to the importance of marketing fruit properly, emphasising the necessity for careful handling, even grading, and attractive packing if satisfactory prices are to be obtained. Those remarks apply equally to the present month, or, in fact, to any month of the year, as there is always more or less fruit of one variety or another to be marketed; and it is simply wasting time and money cultivating, pruning, manuring, or spraying an orchard—in fact, doing everything possible to produce good fruit—if when the fruit is grown it is not put to the market in such a manner that it will realise the highest price. Careful handling, grading, packing, and marketing will secure a ready sale for good fruit in any market, even when the same fruit badly handled and unattractively got up would be unsaleable. Growers would do well to take a lesson in packing from the Californians who have been shipping apples, or from the Italians who are shipping lemons, to this colony, as those fruits, even after a long and trying voyage and one or more transhipments, reach here in better condition and in a much more attractive state than our local fruit, which is often only carted a few miles.

Keep down pests wherever met with; gather and destroy all fly-infested fruit. Destroy orange bugs before they become mature by hand-picking or by driving them to the trunks of the trees, by tapping the other branches with light poles, the insects being brushed off from the trunks and main branches on to a sheet placed under the tree to catch them, from which they can be easily gathered and burnt.

All caterpillars, cut-worms, beetles, grasshoppers, crickets, or other insects destroying the foliage should be destroyed by either spraying the same with Paris green, 1 oz. to 10 gallons of water, or by dusting them with a mixture of Paris green and air-slacked lime, 1 oz. of Paris green to 5 lb. of lime. Keep the orchard well cultivated, especially in the dry districts; and where there is water available for irrigation, in such districts all citrus trees should receive a watering during the month unless there is a good fall of rain, when it will be of course unnecessary.

Pineapples, bananas, and other tropical fruit can be planted during the month, showery weather and dull days being chosen. The rainy season is the best time to transplant most tropical plants. Where it is desirable to go in for green-crop manuring, or for raising the green crop for mulching, cowpeas can be sown, as they will be found to make a very rapid growth now, which will be strong enough to keep most weeds in check.

See that all surface and cut-off drains are in good working order, and not choked up with grass, weeds, &c., as heavy rain may fall during the month, and there should be a get-away for all surplus water, which would tend to either wash the soil or sour it; stagnant water round the roots of the trees being exceedingly injurious at any time, and especially so during the heat of summer.

Farm and Garden Notes for January.

Field.—The main business of the field will be ploughing and preparing the land for the potato and other future crops, and keeping all growing crops clean. Never allow weeds to seed. This may be unavoidable in the event of long-continued heavy rains, but every effort should be made to prevent the weeds coming to maturity. A little maize may still be sown for a late crop. Sow sorghum, imphee, Cape barley, vetches, panicum, teosinte, rye, and cowpeas. In some very early localities potatoes may be sown, but there is considerable risk in sowing during this month, and may be looked upon merely as an experiment. Plant potatoes whole.

Kitchen Garden.—A first sowing of cabbage, cauliflower, and Brussels sprouts may now be made in a covered seed bed, which must be well watered and carefully protected from insect pest. Sow in narrow, shallow drills; they will thus grow more sturdy, and will be easier to transplant than if they were sown broadcast. The main points to be attended to in this early sowing are shading and watering. Give the beds a good soaking every evening. Mulching and a slight dressing of salt will be found of great benefit. Mulch may consist of stable litter, straw, grass, or dead leaves. Dig over all unoccupied land and turn under all green refuse, as this forms a valuable manure. Turn over the heavy land, breaking the lumps roughly, to improve the texture of the soil by exposure to the sun, wind, and rain. In favourable weather sow French beans, cress, cauliflower, mustard, cabbage, celery, radish for autumn and winter use. Sow celery in shallow, well-drained boxes or small beds, which must be shaded till the plants are well up. Parsley may be sown in the same manner. Turnips, carrots, peas, and endive may also be sown, as well as a few cucumber and melon seeds for a late crop. The latter, however, are unlikely to succeed except in very favourable situations. Transplant any cabbages or cauliflowers which may be ready. We do not, however, advise such early planting of these vegetables, because the fly is most troublesome in February. For preference we should defer sowing until March. Still, as "the early bird catches the worm," it is advisable to try and be first in the field with all vegetables, as prices then rule high. Cucumbers, melons, and marrows will be in full bearing; and all fruit as it ripens should be gathered, whether wanted or not, as the productiveness of the vines is decreased by the ripe fruit being left on them. Gather herbs for drying, garlic, onions, and eschallots as the tops die down.

Flower Garden.—To make the flower beds gay and attractive during the autumn and winter months is not a matter of great difficulty. Prepare a few shallow boxes. Make a compost, a great part of which should consist of rotted leaves. Fill the boxes with the compost, then sow thinly the seeds of annuals. Keep the surface of the soil moist; and when the young seedlings are large enough to handle, lift them gently one by one with a knife or zinc label—*never pull them up by hand*, as, by so doing, the tender rootlets are broken, and little soil will adhere to the roots. Then prick them out into beds or boxes of very light soil containing plenty of leaf-mould. Then keep a sharp look out for slugs and caterpillars. Keep a supply of tobacco-dust on hand. Scatter this in the path of the slug, and he will cease from troubling you.

All kinds of shrubby plants may be propagated by cuttings. Thus, pelargoniums, crotons, coleus, and many kinds of tropical foliage plants can be obtained from cuttings made this month. After putting out cuttings in a propagating frame, shade them with a piece of calico stretched over it. Be careful not to overwater at this season. Propagate verbenas, not forgetting to include the large scarlet foxhunter. Verbenas require rich soil. Palms may be planted out this month. If the weather prove dry, shade all trees planted out. With seed boxes, mulch, shade, water, and kerosene spray, all of which imply a certain amount of morning and evening work, the flower garden in autumn and winter will present a charming sight, and will afford light and profitable occupation for girls with spare time on their hands.

Public Announcements.

NOTICES.

The Editor will be glad to receive any papers of special merit which may be read at meetings of Agricultural and Pastoral Associations in Queensland, reserving, however, the right to decide whether their value and importance will justify their publication.

Secretaries of Associations are requested to be good enough to forward to the Editor, as early as possible, the dates of forthcoming Shows, as it is important in the interests of the Associations that these dates should be published

To enable recipients of the *Queensland Agri· ltural Journal* to have the half-yearly volume bound, covers in boards and cloth will be supplied from this office on application to the Under Secretary for Agriculture. Applications must be accompanied by a remittance of Sixpence to cover cost. For the convenience of those who are not within reach of a bookbinder, a Special Cover has been designed, which obviates the necessity for binding. These covers will be supplied at Ninepence each.

For the information of those who are desirous of communicating with the managers of State farms, we give their names and addresses below:—Queensland Agricultural College, Gatton, principal, J. Mahon; Westbrook State Farm, Westbrook, manager, C. Ross; Biggenden State Farm, Biggenden, manager, G. B. Brooks; Hermitage State Farm, Warwick, manager, H. C. Quodling; Gindie State Farm, manager, R. Jarrott; Kamerunga State Nursery, Cairns, manager, Howard Newport.

The Director of the Botanic Gardens desires to state that, a new aviary having been erected in the Gardens, he will be glad to receive birds in exchange for plants.

Birds may be put on rail or boat, addressed to

The Director, Botanic Gardens, Brisbane,

and freight will be settled on delivery in Brisbane.

ADVERTISEMENTS.

Advertisements which relate wholly to the sale of Agricultural Machinery, Seeds, Plants, Manures, Farm Stock, Feeding Stuff, &c., will be inserted in the *Journal* at the following rates:—

	£	s.	d.
Full page, per issue	4	0	0
Half page, per issue	2	10	0
Quarter page, per issue	1	10	0

Lesser space, down to ½-inch, at full page rates.

On advertisements standing for six months a discount of 15 per cent. will be allowed, and 25 per cent. on those inserted for twelve months.

Department of Agriculture,
Brisbane, 20th December, 1901.

IT is notified, for general information, that a Reward of £5,000 for any successful Scheme for the Complete Eradication of the Prickly Pear is offered, subject to the following conditions.

D. H. DALRYMPLE,
Secretary for Agriculture.

CONDITIONS UNDER WHICH A REWARD OF £5,000 IS OFFERED BY THE DEPARTMENT OF AGRICULTURE FOR ANY SUCCESSFUL SCHEME FOR THE COMPLETE ERADICATION OF THE PRICKLY PEAR.

1. The scheme may embrace any mechanical appliance or apparatus for digging, dragging, or tearing out from the ground the entire plant with its roots and the subsequent destruction of the same, or any poisonous or other liquid or powder application, or a combination of the two.

2. The specific or substance, or mechanical appliance or apparatus, to be used shall not hitherto have been made public.

3. The liquid or other substance shall not be injurious to human or animal life by reason of contact therewith in the course of or subsequent to application.

4. The substance, specific, or mechanical appliance or apparatus must be moderate in cost, readily procurable or manufactured, and capable of being economically and speedily applied or worked over a large area.

5. Tenderers to state the maximum cost per acre of their scheme before any experiment or trial will be permitted. If such cost is deemed prohibitive no trial will be allowed.

6. The substance or specific used shall not render the land sterile for any subsequent plant-growth, or otherwise injure the soil.

7. The efficacy of the substance or mechanical appliance shall not be vitiated by subsequent rainfall.

8. The specific or substance must absolutely destroy the prickly-pear through to and including the roots, so that no subsequent growth of the same spring therefrom for a period of at least two years.

9. The apparatus or appliance in which any liquid or powdery preparation, poisonous or otherwise, is used shall be of such material and construction that no erosion or leakage shall take place.

10. That, if successful, the formulæ of such specific or preparation shall be disclosed only to and become, together with the complete plans and specifications of any mechanical appliance or apparatus used in conjunction therewith, or plans and specifications of any mechanical apparatus or appliance alone, absolutely the property of the Department of Agriculture.

11. Experiments in connection with any specific or substance or mechanical appliance shall be carried out on prickly-pear country selected by the Department of Agriculture, under the personal supervision of one or more persons appointed by the Department, and at the cost of the parties competing for the reward.

LIST OF AGRICULTURAL, HORTICULTURAL, AND PASTORAL SOCIETIES AND ASSOCIATIONS IN QUEENSLAND.

Postal Address.	Name of Society.	Name of Secretary.	Show Dates. 1902.	Show Dates. 1903.
Allora ...	Central Downs Agricultural and Horticultural Association	J. H. Buxton ...	5 Feb.	
Atherton ...	Barron Valley Agricultural, Pastoral, and Industrial Association	Thos. Rose... ...		
Avondale ...	Avondale Farmers and Planters' Association	E. P. Dyball ...		
Ayr	Lower Burdekin Farmers' Association	W. H. Wilmington		
Beaudesert ...	Logan and Albert Pastoral and Agricultural Society	M. Hinchcliffe ...	16 July	17 June
Beenleigh ...	Agricultural and Pastoral Society of Southern Queensland	Wilson Holliday ...	19 Sept.	4 Sept.
Biggenden ...	Biggenden Agricultural and Pastoral Society	C. J. Stephensen ...	12 and 13 June	9 and 10 July
Biggenden ...	Biggenden Farmers' Association ...	W. Nott		
Birthamba ...	New Hope Farmers' Association ...	G. W. Nixon ...		
Blackbutt ...	Farmers' Progress Association ...	John Dreghorn ...		
Boonah ...	Fassifern and Dugandan Agricultural and Pastoral Association	C. E. Mackenzie ...	19 and 20 June	9 and 10 July
Bowen ...	Bowen Fruitgrowers and Farmers' Association	W. S. Palmer ...		
Bowen ...	Pastoral, Agricultural, and Mining Association	F. H. Myles ...	21 Aug.	7 Aug.
Bowen ...	Proserpine Farmers and Settlers' Association	R. Toogood ...	1 and 2 Aug.	1 and 2 Aug
Bowen(Proserpine)	Cannon Valley Farmers and Settlers' Association	H. W. Holmes ...		
Booyal ...	Booyal Farmers' Progress Association	Thos. Skillington ...		
Brisbane ...	Horticultural Society of Queensland	J. F. Bailey ...	22 April	22 April
Brisbane ...	Queensland Acclimatisation Society	E. Grimley ...		
Brisbane ...	National Agricultural and Industrial Association of Queensland	Albert E. Harte ...	12, 13, 14, and 15 Aug.	11, 12, 13, and 14 Aug.
Brisbane ...	Queensland Fruit and Economic Plantgrowers' Association	J. F. Cooksley ...		
Brisbane ...	Queensland Stockbreeders and Graziers' Association	F. A. Blackman ...		
Brisbane ...	Queensland Nurserymen's Association	S. C. Matthews ...		
Brisbane ...	United Pastoralists' Association ...	Fredk. Ranson ...		
Brisbane ...	Queensland Chamber of Agriculture	F. W. Peek ...		
Brisbane ...	Queensland Citrusgrowers' Asssociation	R. M. Cooper ...		
Brookfield ...	The Brookfield and Pullen Vale Farmers, Dairymen, and Fruitgrowers' Association	W. R. Moon ...		
Brooyar ...	Brooyar Farmers' Progress Association	E. Pike		
Buderim Mountain	Buderim Mountain Coffee and Fruitgrowers' Association	W. W. Burnett ...		
Bundaberg ...	Bundaberg Horticultural and Industrial Society	H. E. Ashley ...		
Bundaberg ...	Council of Agriculture	R. G. Curtis ...		
Bundaberg ...	Woongarra Canegrowers and Farmers' Association	F. Watson ...		
Bundaberg ...	Bundaberg Agricultural, Pastoral, and Industrial Society	H. J. Page ...	3 and 4 Sept.	10 and 11 Sept.
Burpengary...	Burpengary Farmers' Association ...	F. W. Uhlmann ...		
Byrnestown...	Byrnestown Farmers' Progress Association	Chr. H. Fredriksen		
Caboolture ...	Caboolture Farmers' Association ...	G. Mallet		
Cairns ...	Aloombah Farmers' Association ...	N. P. Petersen ...		
Cairns ..	Cairns Agricultural, Pastoral, and Mining Association	A. J. Draper ...		
Cairns ...	Cairns District Coffee-growers' Association	L. Battinson ...		
Cairns ...	Cairns District United Farmers' Association	Wm. Griffin ...		
Cairns ...	Hambledon Planters' Association ...	A. M. Stephens ...		
Charleville ...	Central Warrego Pastoral and Agricultural Association	E. F. C. Manning		
Charters Towers	Charters Towers Pastoral, Agricultural, and Mining Association	A. H. Pritchard ...	4, 5, and 6 June	4, 5, and 6 June
Childers ...	Isis Agricultural Association... ...	H. Epps		
Childers ...	Doolbi Mill Branch, Isis Agricultural Association	W. T. H. Job ...		

AGRICULTURAL AND HORTICULTURAL SOCIETIES—*continued.*

Postal Address.	Name of Society.	Name of Secretary.	Show Dates. 1902.	Show Dates. 1903.
Childers ...	Childers Mill Branch, Isis Agricultural Association	H. Epps		
Childers ...	Childers Pastoral, Agricultural, and Industrial Society	Richard Beiers ...	...	20 Aug.
Clermont ...	Peak Downs Pastoral, Horticultural, and Agricultural Society	F. Leysley		
Clermont ...	Peak Downs Dairymen and Settlers' Association	A. G. Pursell ...		
Clifton ...	Darling Downs Pastoral, Agricultural, and Industrial Association	P. McCauley ...		
Cooktown ..	Cook District Pastoral and Agricultural Society	W. R. Humphreys		
Cooyar ...	Yeraman Creek Farmers' Progress Association	George Seely ...		
Cooran ...	Cooran Progress and Agricultural Association	Thos. Smith ..		
Cordalba ...	Cordalba Farmers' Association ...	B. Goodliffe ..		
Coulson ...	Coulson Farmers' Progress Association	G. R. Johnson ...		
Crow's Nest	The Crow's Nest Agricultural and Horticultural Society	James Gleeson ...	...	30 July
Currajong ...	Currajong and Gin Gin Agricultural and Pastoral Society	Alfred S. Howard		
Cunnamulla	South Warrego Pastoral Association	J. Winward ...		
Dalby ...	Northern Downs Pastoral and Agricultural Association	J. D. Ramsay ..	...	29 and 30 July
Dallarnil Scrub, *viâ* Degilbo	Dallarnil Farmers' Association ..	W. E. Burton ...		
Danderoo ...	Danderoo Farmers' Progress Association	Wm. Atkinson ...		
Deception Bay	Deception Bay Farmers' Association	B. J. T. Liscombe		
Degilbo ...	Degilbo District Farmers' Association	E. P. Itzstein ...	6 and 7 Feb.	11 and 12 June
Forest Hill ...	Forest Hill Agricultural and Progress Association	D. S. Foreman ...		
Geraldton ...	Johnstone River Sugar-growers and Manufacturers' Association	Ralph Reid ...		
Gladstone ...	Gladstone Pastoral and Agricultural Association	W. J. Manning ...		
Gooburrum, Bundaberg	Gooburrum Farmers and Cane-growers' Association	W. J. Tutin ...		
Goondiwindi	MacIntyre River Pastoral and Agricultural Society	J. D. Hindmarsh...	14 and 15 May	14 and 15 May
Gracemere ...	The Gracemere District Farmers and Progress Association	Arthur E. Fisher...		
Gympie ...	Agricultural, Mining, and Pastoral Society	F. Vaughan ...	17 and 18 Sept.	3 Sept.
Gympie ...	Chatsworth Farmers' Progress Association	F. Ardrey		
Gympie ...	Deep Creek Farmers' Progress Association	H. Bath		
Gympie ...	Gympie Horticultural Society ...	Charles Brasch ...	2 and 3 May	2 and 3 May
Gympie ...	Imbil Road Farmers and Settlers' Progress Association	D. J. O'Farrell ...		
Harrisville ...	Harrisville Farmers' Progress Association	W. J. Burnett ...		
Haslemore, Victoria, Herbert Riv.	Herbert River Farmers' League ...	Alfred Henry ...		
Headington Hill	Headington Hill Farmers' Progress Association	J. E. Stehn ...		
Helidon ...	Helidon Scrub Farmers' Progress Association	Jas. Tysoe		
Herbert River	Halifax Planters' Club	H. G. Faithful ...		
Herbert River	Macknade Farmers' Association ...	Edwin S. Waller ...		
Herbert River	Ripple Creek Farmers' Association ...	J. W. Grimes ...		
Herberton ...	Mining, Pastoral, and Agricultural Association	John M. Hollway	14 and 15 May	
Hodgson ...	Hodgson Farmers' Association ...	A. Brumpton ...		
Hughenden...	Hughenden Pastoral and Agricultural Association	H. P. Blackall ...	7 and 8 May	

AGRICULTURAL AND HORTICULTURAL SOCIETIES—*continued.*

Postal Address.	Name of Society.	Name of Secretary.	Show Dates. 1902	Show Dates. 1903.
Ingham ...	Fairfield Farmers' Association ..	B. Lynn		
Ingham ...	Gairloch Farmers' Association ...	B. Lynn		
Ingham ...	Herbert River Farmers' League ...	H. G. Faithfull ...		
Ingham ...	Herbert River Pastoral and Agricultural Association (Agricultural Show)	P. J. Cochrane ...	28 Sept.	18 and 19 Sept.
Ingham ...	Stone River Farmers' Association ...	F. A. Rankin ...		
Ingham ...	Victoria Farmers' Association ...	W. C. S. Warren...		
Ipswich ...	Ipswich and West Moreton Agricultural and Horticultural Society	P. W. Cameron ...	9 Oct.	8 Oct.
Ipswich ...	Queensland Pastoral and Agricultural Society	Pearson W. Cameron	...	10 and 11 June
Kolan, North	Kolan Canegrowers and Farmers' Association	Jas. H. Hendy ...		
Kilkivan ...	Mondure Farmers' Progress Association	H. J. Compagnoni		
Lakeside ...	Mungore Farmers' Association ...	C. C. Ridley ...		
Laidley ...	Lockyer Agricultural and Industrial Society (at Gatton)	W. A. McIlwraith	30 and 31 July	22 and 23 July
Loganlea ...	Logan Farming and Industrial Association	Wm. G. Winnett, Loganlea		
Longreach ...	Longreach Pastoral and Agricultural Society	J. P. Peterson ...	29 and 30 April	29 and 30 April
Lucinda Point	Victoria Farmers' Association ...	W. S. C. Warren...		
Ma Ma Creek, *viâ* Grantham	Ma Ma Creek Farmers' Progress Association	Joseph Turner ...		
Mackay ...	Agricultural, Pastoral, and Mining Association	F. Black		
Mackay ...	Pioneer River Farmers' Association	E. Swayne	20, 21, and 22 May	17, 18, and 19 June
Mackay ...	The Mackay and District Horticultural Society	Fred. Bourne ...		
Mapleton, *viâ* Nambour	Mapleton and Dulong Fruitgrowers and Farmers' Progressive Association	H. N. Wilson ...		
Maroochy ...	Bli Bli Farmers' Progressive and Industrial Association	H. A. Keil... ...		
Maryborough	Maryborough Horticultural Society...	H. A. Jones ...		
Maryborough	The Island Farmers' Progress Association	H. Simpson, junr.		
Maryborough	Wide Bay and Burnett Pastoral and Agricultural Society	G. Willey ...	10, 11, and 12 Sept.	22, 23, and 24 July
Montville ...	Montville Fruitgrowers and Farmers' Progress Association	Robert A. Bulcock		
Mooloolah ...	Mooloolah Farmers' and Fruitgrowers' Progress Association	C. Court ...		
Mosman River	Mosman River Farmers' Association	Geo. W. Muntz ...		
Mosman ...	Mosman District Agricultural Society	G. W. Muntz ...	...	24 and 25 June
Mount Cotton	Mount Cotton and Redland Bay Fruitgrowers and Farmers' Association	W. E. Burns ...		
Mount Mee...	Mount Mee Farmers' Association ...	R. Thomas ...		
Mount Morgan	Mount Morgan Agricultural, Pastoral, and Poultry Society	J. S. Lyle ...	16 and 17 Aug.	
Mount Ubi, Eumundi	The Kenilworth Farmers' Association	Alex. Purdon ...		
Nambour ...	The Rosemount Association	George Etheridge		
Nambour ...	The Nambour, Blackall Range, and Moreton Agricultural, Mining, and Pastoral Society	J. R. Isgar ...		
Nambour ...	Dulong and Kureelpa Farmers' and Canegrowers' Association	A. A. Petrie ...		
Nambour ...	The Obi Obi Farmers and Dairymen's Progressive Association	A. F. Crichton ...		
Nanango ...	Nanango Agricultural, Pastoral, and Mineral Society	J. W. Sigley ...	7 and 8 May	13 and 14 May
Nanango ...	The Coolabunia Farmers' Association	Ed. T. Randall ...		
Nerang ...	Southern Queensland and Border Pastoral and Agricultural Society	H. J. Cooper ...	21 Nov.	9 Oct.
North Isis ...	North Isis Canegrowers' Association	T. E. Barnes ...		
North Pine ...	Moreton Agricultural, Horticultural, and Industrial Association	N. McKenzie ...		
Nundah ...	Nundah Horticultural, Agricultural, and Industrial Association	G. C. Outridge ...	15 Nov.	24 Oct.

AGRICULTURAL AND HORTICULTURAL SOCIETIES—*continued.*

Postal Address.	Name of Society.	Name of Secretary.	Show Date. 1902.	Show Date. 1903.
Palmwoods ...	Palmwoods Industrial Fruitgrowers' Progress Association	H. Taylor		
Peachester, *viâ* Beerwah, N.C. Line	The Peachester Progress Association	Inigo O. Jones ...		
Pialba ...	Pialba Farmers' Association	J. B. Stephens		
Pittsworth ...	Pittsworth Pastoral, Agricultural, and Horticultural Association	C. Longland ...	26 Feb.	26 Feb.
Pomona ...	Pomona Agricultural and Progress Association	H. Armitage, senr.		
Port Douglas	Port Douglas and Mosman Pastoral, Agricultural, Horticultural, and Mining Association	G. A. E. Rutherford	6 and 7 Aug.	5 and 6 Aug.
Port Douglas	Daintree Farmers' Association ...	J. Carlos Allen Donally		
Rockhampton	Alton Downs Farmers' Association...	Thos. Thomason ...		
Rockhampton	Central Queensland Farmers and Selectors' Association	T. Whitely, Coowonga		
Rockhampton	Central Queensland Stockowners' Association	R. R. Dawbarn ...		
Rockhampton	Rockhampton Agricultural Society...	R. R. Dawbarn ...	18 and 19 June	12 and June
Roma ...	Western Pastoral and Agricultural Association of Queensland	Angus McPherson		
Roma ...	Yingerbay Farmers' Association ...	A. Cook		
Roma ...	Roma Farmers' Association	Duncan Brown ...		
Roma (Blythedale)	Warooby Farmers' Association ...	S. S. Jones... ...		
Rosewood ..	Farmers' Club	P. H. Adams ...	...	3 Sept.
South Kolan	South Kolan Farmers and Planters' Association	John Whalley ...		
Southport ...	Southport Horticultural Society ...	E. Fass		
Springsure ...	Queensland Pastoral Society... ...	G. R. Milliken ...		
Stanthorpe ...	Border Pastoral, Agricultural, and Mining Society	Geo. Simcocks ...	13 and 14 Feb.	13 and 14 Feb.
Stanthorpe ...	Stanthorpe Horticultural and Viticultural Society	Allan F. Cleland ...		
Stanwell ...	The Stanwell Agricultural Society ...	A. Spanner ...		
St. George ...	Balonne Pastoral and Agricultural Association	T. M. Cummings ...		
Taabinga ...	The Taabinga Farmers' Progress Association	T. Pass		
Tinana ...	Tinana Fruitgrowers and Farmers' Association	H. G. Habler ...		
Toowoomba...	Aubigny Farmers' Progress Association	J. R. Torbock ...		
Toowoomba...	Drayton and Toowoomba Agricultural and Horticultural Society	W. G. Searle ...	15 and 16 Jan.	15 and 16 Jan.
Toowoomba...	Royal Agricultural Society of Queensland	F. Burtt	5, 6, 7, and 8 Aug.	5, 6, 7, and 8 Aug.
Townsville ...	Townsville Pastoral, Agricultural, and Industrial Association (formerly North Queensland Pastoral and Agricultural Association)	J. N. Parkes ...		
Upper North Pine	Upper North Pine Farmers' Association	J. Skerman ...		
Wallumbilla	Wallumbilla Selectors' League ...	George Dalziel ...		
Warren Siding	The Stanwell United District Farmers' Union	G. N. Terry ...		
Warwick ...	Eastern Downs Horticultural and Agricultural Association	F. H. Selke ...	29 and 30 Jan.	29 and 30 Jan.
Wellington Point	Wellington Point Agricultural, Horticultural, and Industrial Association	Louis Hugonin ...	16 July	8 July
Woodford ...	Woodford Progressive Industrial Association	E. Heaton		
Woombye ...	Maroochy Pastoral, Agricultural, Horticultural, and Industrial Association	P. S. Hungerford...	7 May	Aug.
Wooroolin, *viâ* Nanango	Wooroolin Farmers' Progress Association	A. Deighton ...		
Woowoonga	Woowoonga Farmers' Association ...	H. A. Wilkinson ...		
Zillmere ...	Zillmere Horticultural Society ...	A. W. Richardson		

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